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ELEMENTS
OF
NATURAL HISTORY,

ADAPTED TO THE PRESENT STATE OF THE SCIENCE,

CONTAINING

THE GENERIC CHARACTERS OF NEARLY THE WHOLE
ANIMAL KINGDOM,

AND

DESCRIPTIONS OF THE PRINCIPAL SPECIES.

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&c. &c.

WITH ILLUSTRATIVE ENGRAVINGS.

VOL. I.

VERTEBRATA.

EDINBURGH:

ADAM BLACK AND JOHN STARK, EDINBURGH:
AND LONGMAN, REES, ORME, BROWN & GREEN, LONDON.

1828.

ADVERTISEMENT.

THE following work, though in some measure elementary, will be found to contain considerably more than a mere Introduction to the study of Natural History. It was originally intended, besides observations on the different Classes, detailing generally the structure and classification of the objects they embraced, to give not only the generic characters of the whole Animal Kingdom, but examples of the principal and most interesting species. In all the classes except two, the INSECTA and ENTOZOA, this has been done, and in most cases the indication has not been confined to a single species. But in the class of Insects this was found to be impossible within the limits prescribed, the objects being so extremely numerous, that the recently established generic distinctions would alone have filled a volume.

In the class MAMMALIA, the *Mammalogie* of M. Desmarest has been followed, with the addition of the species described since that work was published; and in this department, besides the characters of the recent and fossil genera, room has been found for descriptions

of the whole ascertained species. In the class of BIRDS Temminck has been taken for the guide ; and in addition to the European species described by that celebrated ornithologist, the characters, and at least one typical species, of all the extra-European genera have been given. The arrangement of Baron Cuvier has been followed in the classes of REPTILES and FISHES.

The classes MOLLUSCA and CONCHIFERA, including the fossil genera, and the class TUNICATA, have been adopted from M. Lamarck ;—the CIRRIPEDA and ANNELIDES chiefly from Latreille—the CRUSTACEA from the same author, Dr Leach, and Desmarest—the MYRIAPODA from Latreille—and the characters of the INSECTA have been almost wholly taken from the writings of that distinguished entomologist. In this class, however, in place of detailed generic characters, room has only been found for analytical tables. These, with the descriptions of the families and tribes, will, it is hoped, enable the student or traveller to refer any insect met with, if not to its proper genus, at least to the tribe or family to which it belongs. The class ACALEPHA is adopted from Cuvier—the ENTOZOA from the same author and Rudolphi—and the POLYPI and INFUSORIA chiefly from Lamarck.

In the whole work, indeed, it has been a principal object to give, in the arrangement of the different clas-

ses, the methods adopted by naturalists of the first eminence, and most generally followed,—keeping in view the great outline of Cuvier, founded on the comparative organization of the animal races. The other systems which have been at various periods proposed are noticed in the introductory observations at the head of each class. In most cases the Linnæan name, where it has not been followed as the leading term, is given as a synonym.

As the place of the different classes of animals in the series is determined by their comparative organization, a short sketch of the internal structure as well as of the external characters of each group is given in the respective introductions. The details on this part of the subject, which are chiefly from Cuvier and Dumeril, will be found of material use to the student of Comparative Anatomy, in connecting with his researches the zoological history of the various races.

To complete the plan, a short Introduction to Botany, embracing a general view of the structure of the Vegetable Kingdom, of the system of Linnæus, and the Natural Families of Jussieu, follows the Zoological part of the work; and a brief sketch of the Mineral Kingdom, including Mineralogy and Geology.

In the collection and arrangement of the materials, every accessible source has been consulted; and gene-

ral remarks have been inserted to lighten the details of scientific arrangement. In the absence of a System of Nature adapted to the present state of knowledge, this work, it is hoped, will form a useful guide to the student of Nature, as, however imperfectly executed, it is the only one in which a consecutive and complete view of the modern classifications of Animals has been offered to the notice of the Public.

Edinburgh, 14th October 1828.

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ELEMENTS

OF

NATURAL HISTORY.

INTRODUCTION.

THE object of Natural History is the Material World, and the various classes of organized and inorganic bodies which form its component parts. To examine and arrange these in connection with the laws by which they are governed, to investigate their structure, their history, and their uses, is the province of the Naturalist. In its most extended sense, Natural History embraces all the visible creation, and includes every object in that creation, from the most magnificent of the celestial bodies to the smallest insect or particle of dust which is found in the globe inhabited by men. A field so extensive, compared with the limited powers of the human faculties, is too vast for the subject of individual research; and in detail its objects are so numerous, that to possess a knowledge of even a small portion of these, has been considered a competent task for a life spent in investigation.

For this reason it has become matter of necessity to subdivide and arrange the objects of the material world into portions, suitable to the powers and the intelligence of those whose province and interest it is to investigate the wonders of Creation. One great branch, termed NATURAL PHILOSOPHY, has thus been divided into numerous departments, of which DYNAMICS, or the doctrine of the laws of motion and its effects, and its subsidiary divisions, Statics, Hydrostatics, &c. offer a wide field to investigation. The observation of the positions and revolutions of the Heavenly bodies has become the province of that branch of Natural Science denominated ASTRONOMY; the nature,

motion, and qualities of light form the science of *OPTICS*: the changes that take place in the atmosphere, as they are perceived by the senses, or indicated by instruments, is the object of *METEOROLOGY*: And it is the province of *CHEMISTRY*, another great branch of Physical Science, to investigate the mutual agencies of the elementary principles of matter upon one another, their composition, and the laws by which they are regulated. These divisions of the great field of Natural Science have, from the universality of their influence, been called *General Physics*; while Natural History in its limited sense, and as confined to the examination of what have been called the three kingdoms of Nature, viz. the Animal, Vegetable, and Mineral, has received the name of *Particular Physics*. Natural History, besides, is distinguished from the other branches of science now named in this, that while Dynamics is a science chiefly of Calculation, and Chemistry of Experiment, the basis of this great science rests chiefly on Observation.

In the limited sense in which Natural History is thus to be understood as confined to the three great divisions of Animals, Vegetables, and Minerals, a System of Nature is a grand catalogue of the objects in these kingdoms, in which each individual has a distinctive character and an appropriate name. These individuals, for the sake of arrangement, are collected into groups which have something in common, and which are termed *Genera*; Genera are further combined into other groups, which form in systems what are called *Orders*; and Orders are finally arranged under one great head, which is termed a *Class*. This scale of divisions, of which the highest contains the least, is, as Baron Cuvier remarks, a kind of dictionary, where the properties of things are investigated to discover their names, and which reverses the usual order of such works, where the names are indicated as detailing the qualities of the things named.

But though method and arrangement form the first step to the knowledge of the numerous objects which claim the attention of the naturalist, Natural History is by no means confined to a list of names. If the method be a good one, and the subdivisions arranged conformably to the fundamental and natural connections of bodies, the very arrangement and classification of names of beings which have something in common, leads to the

knowledge of their connection and dependence upon one another, and to their comparative importance in the scale of existence. Were it possible to arrange all the classes of organized and inorganic existences in such a manner that the individuals of the same genus should be more nearly connected with that genus than with any other—the genera of the same order more nearly connected with that order than with all the other orders, and so on,—little more would be necessary to make the method, so far as depends on arrangement, complete. But it has not hitherto been found in practice, that characters sufficiently uniform, and at the same time easily cognizable, can be found for arranging all the groups of individuals into closely connected families. Aware of this, Linnæus in his *Systema Naturæ* employed one system of organs in his division of its various objects ; while those who attempt to class individual species according to what is called the Natural Method take the whole structure of the objects into consideration. The last of these methods, it is evident, could it be carried into effect, would be the most philosophical ; but either system followed exclusively is found to produce the most heterogeneous combinations. That system, then, is to be considered the best, which, in addition to short and clear diagnostic characters, affords the greatest facility in investigating the productions of nature.

The term *Nature*, it may be remarked, bears various significations. It is sometimes used to signify the properties which a being derives from original conformation, in opposition to those which it has acquired from art ; sometimes to express the whole objects which compose the universe ; at other times the laws which regulate this universe ; and these laws being, in point of fact, the will of that Beneficent and Omnipotent Being who formed all this “ gay creation,” the word *Nature* is frequently employed by a figure of speech to designate its great Author.

The first great division of natural objects is into ORGANIZED and INORGANIC bodies ; the first including *animals* and *plants*—the second *minerals*. These distinctions are easily understood, and have been universally acknowledged to be conformable to nature. Vitality distinguishes the one—the want of vitality characterizes the other.

The objects of Natural History are further arranged into three

great divisions, which have appropriately enough been called *kingdoms*, viz. the ANIMAL—the VEGETABLE—and the MINERAL kingdoms. These divisions are not less proper than convenient; and although some writers believe it possible to trace a continuous but progressive connection from the most perfect animal in the scale to the inert and lifeless rock, yet there seems no good reason for supposing that such a chain exists, or if existing, that all the links shall ever be discovered. The works of the Author of Nature are indeed all in consistent harmony with one another, and there is a mutual dependence, advantageous to all, among the various classes of organized beings: but between the lowest form of vegetable or animal life, and the most symmetrically disposed crystal in the mineral kingdom—between a living body and inert matter—there is an immeasurable distance; and between the highest of the lower animals and Man, of all beings alone endowed with the power of reason and the faculty of speech, a distance still more incalculable.

Animals have been defined to be organized bodies which have life and sensation, and are capable of voluntary motion;—*Vegetables* organized bodies, endowed with a vital principle, but wanting sensation;—and *Minerals* unorganized bodies, without life, and of course without sensation.

It has been found impossible to give a satisfactory definition of *Life*; and physiological writers have therefore limited their efforts to communicate some idea of the vital principle by remarking its effects. Life, where its effects are most easily recognized, seems to consist in the faculty with which certain corporeal combinations are endowed, of existing for a certain period under a determinate form, and assimilating to their substance a part of the surrounding bodies; at the same time restoring to the elements part of their own substance. This vital principle, which, when allied to matter, controls its affinities and directs its forms, is not palpable to the senses in an uncombined shape, and it is only from its effects on material substances that its existence is demonstrated. Baron Cuvier compares the mechanical action of life on matter to a vortex more or less rapid, more or less complicated, where the supply and the waste of particles occasion a constant movement. While this movement subsists, the body which exercises it lives; when the movement is stop-

ped beyond recal the body dies. After death, the elements which composed it, delivered to the ordinary chemical affinities, soon separate to form other and new combinations.

All living bodies die after a period of which the limit is determinate for each species; and death indeed appears to be a necessary result of vital action, which insensibly alters the organic structure. The living body, which derives its mysterious birth from another living body which has preceded it, at first enlarges in dimensions, according to certain proportions and limits fixed for each species, and for each of its parts; these parts gradually increase in density; the fibres and vessels which compose them imperceptibly acquire a rigidity which unfits them for the discharge of their functions, the vital impulse ceases, and the body naturally dies. In short, absorption, assimilation, exhalation, developement, and generation, are functions common to all living beings; their birth and their death the universal terms of their existence.

Organization presupposes life, and the organization of each being implies the life proper to that being. Life indeed is never seen but in connection with an organized body; and all the ingenuity of the materialist has failed to show, that particles of matter can organize themselves, or be organized by any combination known in chemistry. In fact, vitality exercises upon the elements which form at each instant part of the living body, an action contrary to what the ordinary chemical affinities can produce without this master agent; and no power in nature is known capable of reuniting again, in the same manner, the atoms which have been disjoined by death.

Animal life is distinguished from *vegetable life* by the power of locomotion and sensation; the first is active—the other passive. The nourishment of plants is derived through the medium of their roots; that of animals through a central organ of digestion destined to receive the food. The organization of this cavity and its appurtenances varies according to the nature of the aliments and the alterations which they undergo before furnishing fluids proper to be absorbed; while the atmosphere and the earth supply vegetables with juices ready for absorption. Animal bodies, besides, at least those classes higher in the scale of existence, possess a circulating system, muscles for voluntary move-

ment, and nerves for sensation. Respiration is another essential function in the animal constitution; and in proportion as the respiratory system is complete, the animal functions are more fully exercised. In addition also to the chemical elements which enter into the composition of vegetables—oxygen, hydrogen, and carbon—a fourth substance, azote, seems almost peculiar to the animal constitution. To complete the distinction between animal and vegetable life, Hedwig has ingeniously remarked, that in vegetables the sexual organs fall each year, or at each production, while animals preserve them through the whole course of their existence.

As *nutrition* is the most general function of living bodies, under the name of *organs of nutrition* are comprehended all the parts of the body by which alimentary matters are introduced for its support, or which are employed in preparing the food for that purpose. The materials of nutrition penetrate by various means into organized bodies. They may either be introduced under the form of elastic fluids by the *pores* or imperceptible interstices in all living bodies, or they may be conveyed by a particular organization for this purpose into an internal organ of digestion. Sometimes this internal canal or digestive cavity has the form of a tube with two orifices, the one for the entrance of food, the other for the exit of matters unfit for the purposes of life; others have only a single opening destined to this double use; and a few which are found in water absorb their nourishment in the manner of vegetables, with this difference, that the canals which run from these numerous mouths end in a common cavity. The solid matters introduced into the digestive cavity or stomach are converted by an internal process first into a pulpy mass named *chyme*, and afterwards into a semi-fluid substance denominated *chyle*, which is finally taken up or absorbed by appropriate vessels, and conveyed to the great centre of circulation, the heart.

The movement communicated by the action of the *heart* to the internal fluids, now mixed with other animal liquids and termed blood, by which they are impelled through the body, is known by the name of *circulation*. The vessels which conduct the blood or chyle to the heart are called *veins*; those which conduct it from the heart to the other parts of the body

are called *arteries*; and the alternate dilatation and contraction of this important organ is the mechanism by which this object is accomplished. In certain classes of animals, in which the circulation is simple, the venous blood terminates in a kind of reservoir or appendage to the heart named an *auricle*. A muscular apparatus attached to this sinus propels the blood which it receives through an orifice, into the cavity of the heart. The *ventricle*, composed of thicker and stronger muscular walls, is furnished with moveable valves, which prevent the blood from returning into the auricle, while it is impelled by the contraction of the ventricle into the artery. This arrangement varies much, both in the mechanism and in the number of auricles and cavities in the ventricle, in different classes, and even in families of the same class of animals.

The liquid prepared by the process of digestion requiring to be submitted to the action of the atmosphere, or water containing air, to absorb the oxygen and deprive it of certain principles, the function by which this is accomplished is called *respiration*. The organ which performs this service is the *lungs*, through which the blood is forced by the action of the heart. In animals doomed by their organization to live constantly in water, respiration is effected by means of membranous laminæ called gills (*branchiæ*,) which separate the air from the water as it passes over their multiplied surface.

Among animals which appear to have no true circulation, there exists another mode of respiration by tracheæ or air-vessels, by which the air is conveyed through the body in elastic canals; and in these animals it is through their integuments, which are soft and easily permeable, or on their surface, that the respiratory function is exercised, as in vegetables.

In many animals the mode of *generation* is not known. Of others fixed to solid bodies, like vegetables by their roots, the power of reproduction seems to be by buds or *gemmæ*, or by means of a separation, which operates naturally or accidentally, of some parts of their bodies, in which are ultimately developed the organs which at first were wanting. In all other animals there are organs specially destined to generation. These organs distinguish the males from the females. In the greater part of animals the sexes are distinct and separate in two different indi-

viduals of the same species ; but in some classes the individuals are at once males and females. In this case these beings are termed *androgynous*. Sometimes the individuals possess both sexes, like the greater number of vegetables, and they are then called *hermaphrodites*.

The animals which have the sexes separate differ also among themselves. Those are termed *oviparous* in which the germ of the young individual is separated from the parent for a time before birth under the form of an egg. *Viviparous* animals, on the contrary, are those in which the young are nourished in an organ termed the uterus, and are not excluded from the mother till they have taken the form which they afterwards preserve.

Other modifications are noticed among the oviparous animals, or those which deposit eggs. In some the egg is impregnated within the animal, and then the shell or covering is generally solid or corneous. In others, such as fishes, frogs, some insects, and many mollusca, the impregnation of the ovum does not take place till after extrusion. Two remarkable circumstances have been further observed among oviparous animals. The one is, that in some species the ova are not truly excluded but hatched in the parent animal, who thus preserves the imperfect beings till they have acquired the requisite solidity for being deposited in a place adapted to their further developement. These species, which are met with in very different classes, are termed *ovo-viviparous*. The other singular fact to be noticed in regard to oviparous animals is, that in a very great number of species the young when hatched have neither the form, the structure, nor the manners of the parent animal, and many live in altogether a different medium. These animals undergo in the course of their limited existence many organic transformations or successive metamorphoses. Such in particular are the frogs and connected genera, and the whole class of insects.

The moving power is another characteristic of animal organization. It is seated in the *muscular fibre*, which is formed of filaments of excessive tenuity, capable of contraction, and of moving the parts upon which they are fixed. These fibres are distributed over the body, and produce all its exterior and interior motions. When they are united in a bundle, of which the mass co-operates in the same action, this bundle is termed a *mus-*

cle. In animal bodies there are as many different muscles as there are simple movements ; and besides, there are generally, for the purpose of bringing back the parts to their original position, other bundles of fibres destined to produce a contrary effect, and which have been accordingly termed *antagonist muscles*. The element of the muscular fibre, chemically considered, appears to reside in a matter called *fibrine*.

The other organs destined to the purposes of movement are altogether passive. Sometimes they are disposed outwardly under the appearance of membranes or integuments more or less solid, sometimes under the form of crusts or sheaths, in the interior of which the muscles are placed. The solidity of these parts, their structure, their articulation, and movements, correspond to the animal's mode of life ; and these crusts, shells, scales, or sheaths, are of a calcareous or horny nature, and adapted to the efforts they are destined to sustain,—the more soft coverings of this kind, as may be conceived, being only calculated for motion in fluids.

In the higher classes of animals the solid articulated parts which form the frame-work of the body and modify its form are almost always placed internally, and serve the purpose of jointed levers, and as a fulcrum for their muscular coverings. These parts are the *bones* of animals, and when arranged as a whole they are termed the bony skeleton. All these bones meet in a central stalk, or hollow and moveable column, called the *spine*, of which the pieces, more or less solid and numerous, are termed *vertebræ*. Among those which are on this account named *Vertebrated Animals*, the column is terminated at one end by the cranium, a bony cavity inclosing the mass of cerebral matter which gives sensation, and is the seat generally of four organs of sense. In the head is also placed the mouth, an instrument capable of prehension, and provided with organs for mechanically dividing the aliment ; and often also in this important part of animals the organs are placed which produce or facilitate the action of respiration. The spine is generally prolonged behind, and forms the tail in many animals.

The mechanical apparatus by which animals acquire the knowledge of what is around them are termed *organs of sense*, and the impressions made on these by external objects, *sensa-*

tions. The medium by which these sensations are conveyed to the brain, the great centre of nervous energy, is through nerves, and the whole apparatus of sensation is termed the *nervous system*. In animals not possessed of a brain or spinal column, cords or threads of nervous matter, with thickenings or ganglions at certain distances, form their medium of sensation; and although in some groups of animals composed of soft parts, or of extreme tenuity, the presence of nerves has not been satisfactorily traced, yet there seems little reason to doubt the existence, in a greater or less degree, of the faculty of sensation in even the lowest of the animal races.

The material substance of animal bodies, in an anatomical view, may be divided into solids and fluids. The solid portions are named *tissues*, and are united or combined in various degrees in the animal organs. These tissues have been distinguished by anatomists by their forms, or by the chemical elements which enter into their composition. They are chiefly the following: 1. The *cellular tissue*, forming in the greater number of animals the connecting medium of all their organs, and enveloping and penetrating them by a reticulation of a spongy nature, which takes the form of cells, capable of distension by the fluids which it includes. 2. The *fibro-gelatinous* tissue is a collection of solid, tenacious, and resisting fibres in their longitudinal direction, flexible and elastic across, whose use seems to be to communicate movement and resist the efforts of exterior force. It is so named from dissolving in boiling water to the consistence of a jelly. 3. The *membranous tissue* is a disposition of thin membranous flexible laminæ extended like a web, and various in structure and uses. The cutaneous membrane envelops the superficies of the body and permits absorption and exhalation. It is formed of many layers, and produces the hair, feathers, nails, scales, &c. of the animal body. Other membranes are called *mucous* or *folliculous*, because they secrete a viscid fluid, which lubricates their internal surface; and *serous* membranes are those so named from their internal smooth and polished surface exhaling a very liquid humour. They form thin and transparent sacs without openings, which facilitate the reciprocal movements of the organs. 4. The *vascular tissue* is formed of continuous membranous branched tubes, to receive, con-

tain, and direct the nutritive juices from the organs where they are prepared, till they are required for the purposes of nutrition, respiration, or the secretions. 5. The *glandular tissue* includes those secreting organs which produce fluids for internal use, or to transmit them out of the body by means of excretory canals. These organs have a granular or lobated form. 6. The *bony tissue*, or cartilaginous, calcareous, and corneous, is formed by the mucous or gelatinous parenchyma, in which are deposited the hardest and most resisting parts, which protect the body and contribute to its motion. 7. The fibrinous or *muscular tissue* is composed of filaments disposed in bundles, which, from their power of contraction, produce all the movements which characterize animals. 8. The *nervous tissue* is a net-work of filaments and tubes, in the interior of which are found prolongations of the cerebral matter. This tissue, extending from the centre to the circumference like radii from a centre, is the medium of sensation, actuates every member through the medium of volition, and connects all the parts of the body by a mutual sympathy.

The animal *fluids* are found in the body under the form of gases or liquids of various consistence. The first being absorbed or exhaled are but momentarily under this form. The fluids are the chyme, the chyle, the lymph, the blood, and the serous, albuminous, mucous, saline, and other humours peculiar to different parts of the body.

The simple chemical elements which are found in the animal structure are, among the imponderable agents, caloric, light, and the electric fluid. Among the simple gases, azote, which enters into the composition of many of the tissues; hydrogen, which is one of the elements of lymph, bile, &c.; oxygen, which all animals absorb in the act of respiration; carbon, lime, sulphur, iron, &c. which serve as the base of many salts formed by carbonic and phosphoric acid.

The instincts and habits of the different classes of animals will be hereafter detailed, in the descriptions of the individual species whose manners have been most accurately observed. It is sufficient in this place to state, that all their motives to action, their migrations, and their instincts, may be traced to

the desire of self-preservation and the impulse of reproduction.

The VEGETABLE KINGDOM is sufficiently distinguished from the animal, as before remarked, by its passive character, by the want of spontaneous motion, and of sensation. Vegetable life is therefore supported by absorption; and its functions, like those of animals, are exercised in nutrition, developement, and reproduction. The principal part of the nourishment of plants is derived from their roots; and their texture is composed of tissues and vessels formed for absorbing, retaining, and elaborating the nutritive juices drawn from the soil and atmosphere. The vegetable kingdom likewise has this analogy among others with the animal, that the function of reproduction is performed through the medium of sexual organs. These organs are protected by the corolla or flower; and all the display of colour and form in this essential part of vegetables is, like the notes of many birds, connected with the important purpose of the continuation of the species. The number, form, and situation of these organs has afforded to Linnæus the chief characters in his simple though artificial arrangement of the classes and orders of plants, in consequence termed the *sexual system*; while what is called the natural system, proposed by Jussieu, is founded chiefly upon the presence or absence and the nature of the seed or germ—the relative position of the stamina—and upon the absence or presence and form of the corolla.

The MINERAL KINGDOM is distinguished from the other two great divisions by the absence of vitality and organic structure. Forming the solid crust of the globe, the mineral kingdom in its various compounds affords support and sustenance to the organized beings existing on its surface. The constitution and arrangement of the mineral strata have given rise to various theories to account for their present appearance; but facts have not yet been sufficiently multiplied to afford a satisfactory solution. One great line, however, is drawn between those mineral strata which have been termed Primitive, in which no organized remains occur; and those of posterior formation, in which the remains of plants and animals are discovered. The

principal external characters of the mineral kingdom are taken from their *specific gravity*, as compared with water,—*hardness*,—*crystallization*, when it exists,—and *cleavage*, or the direction of the lamellæ, which in many minerals is regulated by the relation of the external surfaces to the primary crystal or form. Of a less constant kind are colour, degree of transparency, fracture, and the streak which many minerals show when scratched. The physical characters are fusibility, solubility, phosphorescence, electricity, magnetism, and refraction.

Linnaeus in his *Systema Naturæ* arranged the Animal Kingdom into six classes; the Vegetable Kingdom into twenty-four; and the Mineral Kingdom into three. As this arrangement, though now modified and extended in many of its parts, as will be detailed elsewhere, forms the basis of modern classification, and was the first successful attempt at arranging in intelligible order the various objects of Natural History, its principal divisions are subjoined. *

ANIMAL KINGDOM.

CLASS I. MAMMALIA.

- ORDER I. Primates,
 II. Bruta,
 III. Feræ,
 IV. Glires,
 V. Pecora,
 VI. Belluæ,
 VII. Cete,

CLASS II. AVES.

- ORDER I. Accipitres,
 II. Picæ,
 III. Anseres,
 IV. Grallæ,
 V. Gallinæ,
 VI. Passeres,

CLASS III. AMPHIBIA.

- ORDER I. Reptilia,
 II. Serpentes,
 III. Nantes,

CLASS IV. PISCES.

- ORDER I. Apodes,
 II. Jugulares,
 III. Thoracici,
 IV. Abdominales,

CLASS V. INSECTA.

- ORDER I. Coleoptera,
 II. Hemiptera,
 III. Lepidoptera,
 IV. Neuroptera,
 V. Hymenoptera,
 VI. Diptera,
 VII. Aptera,

CLASS VI. VERMES.

- ORDER I. Intestina,
 II. Mollusca,
 III. Testacea,
 IV. Lithophyta,
 V. Zoophyta.

* *Systema Naturæ*, ed. 12. Holmiæ, 1766.

THE VEGETABLE KINGDOM

is divided into twenty-four classes, according to the number and position of the stamens ; the greater part of the orders from the number of the pistils in the flower ; others by the situation of the seeds and form of the seed-vessels ; in compound flowers from the arrangement of the florets ; and the great class of cryptogamic plants, or plants without conspicuous flowers, form four orders, divided into *Filices*, *Musci*, *Algæ*, and *Fungi*.

THE MINERAL KINGDOM

is divided into three classes, viz. I. PETRÆ, II. MINERÆ, III. FOSSILIA, and numerous subdivisions. But as the Mineral Kingdom had attracted but little of the attention of Linnæus, and the progress of Chemistry has since changed the whole science of Mineralogy, it is not necessary here to give the inferior details.

Such is the “ field of realities,” as M. Lamarck terms it, which the study of nature offers to the intelligent mind. Life in all its aspects is exhibited in countless forms, and the regular succession of organized beings present the creation in the attractive features of perennial youth. Without herbivorous races, the vegetable kingdom would soon encumber the surface of the globe ; without carnivorous animals the others would multiply beyond their means of support ; and provision is made in those tribes whose food is decomposing substances, to free the earth from dead animal remains. By no conceivable means could the same amount of existence and happiness be attained ; and the whole system is so wonderfully arranged, that among the numberless existences which people the earth, the air, and the waters, there is a constant harmony between the means of existence and the existing beings. While animals useful to others are produced in amazing numbers, the fecundity of others whose physical powers might otherwise give them a superiority are limited, and species apparently the most defenceless are provided with means of protection which insure their perpetuity. To Man alone, as the intelligent head of the whole, is given the dominion over the inferior creatures ; his reason has enabled him to apply to his use the whole of the organized and inorganic bodies

around him, and left him, within certain limits, the accountable master of the creation.

On the utility of a knowledge of the objects of Nature, to a being depending on her productions for the supply of all his conveniences and wants, it is scarcely necessary to insist. No species of human learning is so well calculated to form habits of attention and correct observation as the study of the different branches of Natural History, and none is more admirably adapted to the feelings and capacities of the young. Besides the improvement of the intellectual powers which the examination of the structure and habits of any class of organized beings is calculated to produce, and the associations likely to be thereby awakened, there is something in the study of nature which approaches to philosophy of a higher kind—something that, while it teaches man his place in this Creation of Wonders, infallibly leads him to admire the wisdom, and power, and goodness displayed by its Great Author.

I.—THE ANIMAL KINGDOM

ACCORDING to Cuvier there are four principal forms after which all living beings seem to have been modelled. The basis of these distinctions is laid in the organization of the creatures themselves. Sensation and movement are the characteristics of animals. The heart and the organs of circulation seem a kind of centre for those functions which may be called vegetative, while the brain and the nervous system form the principal source of the functions more exclusively animal. Descending from the higher to the lower races of animals, both these systems are found gradually to become more imperfect, and finally to disappear altogether. In the lowest tribes in the scale, where nerves are no longer visible, the muscular fibre also ceases to be distinct, and the organs of digestion are reduced to a simple cavity in the homogeneous mass. In insects the vascular system disappears even before the nervous system; but in general the dispersion of the medullary masses is connected with the agents of muscular motion: a spinal marrow upon which knots or ganglia represent as many brains or seats of sensation, corresponding to the structure of a body divided into numerous rings, and supported by pairs of limbs distributed along these annulations. This relative proportion in the structure of general forms, which results from the arrangement of the organs of motion, from the distribution of the nervous masses, and from the energy of the circulating system, constitutes the basis upon which M. Cuvier has founded the principal divisions of the Animal Kingdom.

In the *first* of these general forms, which is that of Man and the animals which resemble him most nearly, the brain and the principal trunk of the nervous system are inclosed in bony cases, the first called the cranium, the second the vertebræ. To the sides of the vertebral column, as to a centre, are attached the ribs, and the bones of the members which form the framework of the body. The muscles in general cover the bones, which they put into action, and the viscera are inclosed in the

head and trunk. Animals of this form are called VERTEBRATED ANIMALS, (*Animalia Vertebrata.*)

They have all red blood, a muscular heart, a mouth with two horizontal jaws, distinct organs of vision, hearing, smell, and taste, situated in cavities of the head, and never more than four limbs. The sexes are always separate, and the distribution of the medullary masses and the principal branches of the nervous system is nearly the same in all.

On a close examination of any of the characters of this leading division, some analogy of conformation is always found, even in the species the most remote from each other; and the gradation of the same general plan is to be traced from Man down to the lowest of the fishes.

In the second conformation peculiar to animals there is no internal frame-work or skeleton. The muscles are simply attached to the skin, which forms a soft and contractile covering, from which proceed, in many species, stony plates or envelopes denominated shells, of which the position and production are analogous to that of the mucous body. The nervous system is with the viscera included in this general covering, and is composed of many scattered masses united by nervous threads. The principal of these, placed upon the œsophagus, is denominated the brain. Of the senses, properly so called, the organs of taste and sight are alone to be distinguished, and even these are sometimes wanting. One family alone exhibits the organs of hearing. This division, however, is always characterized by a complete circulating system, and particular organs for respiration; and the organs of digestion and secretion are little less complicated than those of the vertebrated animals. Though the general plan of their organization be not so uniform in regard to external configuration as the preceding division, yet even between these parts there is always an analogous resemblance in structure and functions. This division is termed MOLLUSCOUS ANIMALS, (*Animalia Mollusca.*)

The third general form is that which is observed in insects, worms, &c. Their nervous system consists in two long cords extending along the belly, and swelled out at intervals into knots or ganglia. The first of these, placed upon the œsophagus, though

held analogous to the brain, is but little larger than the others. The covering of the body is divided by transverse folds into a certain number of rings, of which the teguments are in some hard, in others soft, but to the interior of which the muscles are always attached. Articulated limbs are often attached to the sides of the annulated portions of the trunk, but it is also frequently destitute of those organs of movement. To these animals Cuvier has given the name of **ARTICULATED ANIMALS**, (*Animalia Articulata*.)

In this division is observed the transition from the circulating system in closed vessels, to a nutritive process by simple imbibition; and also a corresponding transition from respiration by circumscribed organs to respiration performed through the medium of tracheæ or air-vessels dispersed through the body. The organs of taste and sight are very evident in the animals of this division. Their jaws, when they have any, are invariably lateral. One family alone possesses the organ of hearing.

The animals comprehended under the fourth general form are usually known under the name of *Zoophytes*. They approach in structure to the homogeneous character of plants. Neither a distinct nervous system, nor particular organs of sense, are perceptible, and but obscure vestiges of circulation. Their respiratory organs are almost always on the surface of their bodies. The intestines of the greater number consist merely in a cavity without an outlet. The lowest in the series, which are also the last of the animal tribes, exhibit nothing but a homogeneous pulp, possessed of motion and sensibility. In the preceding divisions the organs of movement and sense are disposed symmetrically on both sides of an axis; but in this they have a circular arrangement round a common centre. This form of existence Cuvier arranges under the head of **RADIATED ANIMALS**, (*Animalia Radiata*.)

The term Zoology includes the whole of the Animal kingdom; besides which different departments have received particular names, such as *Ornithology* for the birds, *Ichthyology* for the fishes, *Entomology* for insects, and *Conchology* for the testaceous Mollusca.

FIRST DIVISION.

VERTEBRATED ANIMALS.

THE body of vertebrated animals is sustained by a skeleton composed of many pieces connected together, and moveable upon one another. The body is composed of a head, a trunk, and limbs. The head is formed of the cranium, which includes the brain, and of the face, composed of two jaws. In the face are the organs of sense. The trunk is sustained by the spine and ribs. The spine is composed of vertebræ, which move upon one another, all of which have a cylindrical opening in the centre, forming together a canal containing the portion of nervous matter called the spinal marrow. The ribs are semicircular, and protect the sides of the cavity of the trunk. They are generally articulated by one extremity to the vertebral column, and by the other to the sternum. In some species they are scarcely perceptible.

The vertebrated animals have never more than two pair of limbs; sometimes indeed one or other of these pairs is deficient, and sometimes both. According to the motions to which these limbs are destined to be subservient, the anterior ones assume the form of hands, feet, wings, or fins; the posterior of feet or fins.

The blood of the vertebrated animals is always red, and seems by its composition adapted to sustain energy of sensation and muscular vigour. The correspondence of the blood with the respiration necessary to the several species of these animals has suggested their division into Classes.

The external organs of sense in all vertebrated animals are two eyes, two ears, two nostrils, the teguments of the tongue, and the teguments of the whole body. The nerves unite with the nervous matter in the vertebræ, and terminate in two medullary cavities in the cranium, the volume of which is generally proportioned to the extent of intellectual capacity.

There are always two jaws, an upper and under one. The principal motion exists in the lower, which has the power of elevation or depression. In the greater number the upper jaw is completely fixed and motionless. Both are generally provided with teeth, excrescences of a peculiar nature, similar in chemical

composition to bone, but which grow from the jaws by a process of secretion. The jaws of one entire class, however, (that of Birds) and the genus *Testudo* in that of Reptiles, are invested with a horny substance.

The intestinal canal extends from the mouth to the anus in various degrees of expansion or contraction. It possesses certain appendices, and receives liquids of a solvent nature, viz. saliva from the mouth, the secretion of the gland denominated pancreas, and the bile, which is produced by another large gland, the liver.

In the passage of the food through the alimentary canal, the part of it adapted to the purposes of nutrition, and termed the chyle, is absorbed by the lacteal vessels, and conveyed into the pulmonary artery, where, in combination with the blood, it undergoes a certain change; and after each portion of the body has received its proper supply, the remainder is carried back into the veins by a set of vessels analogous to the lacteal, and which together form what is usually called the lymphatic system. The veins carry back to the heart the blood which has served the purposes of nutrition. This blood, however, must pass either wholly or partially into the organ of respiration for the purpose of resuming its arterial character, before it is carried back by the arteries to the different parts of the body. In the three first classes of vertebrated animals the organ of respiration consists of lungs, an assemblage of small cells permeable by the external air. In fishes alone respiration is performed by gills or *branchiæ*—a series of laminae between which the water passes.

In all vertebrated animals, the blood which furnishes to the liver the materials of the bile is supplied from the venous blood which has circulated in the intestines, and which, after being reunited in a trunk called the *vena porta*, is again divided at the liver, and distributed in ramifications through its substance.

The sexes in this division are always in separate individuals; but the mode in which fecundation is performed is different in the various classes.

Though in all these points the vertebrated animals have a general resemblance, yet the various beings of which this division is composed present peculiarities, which are the foundation of their arrangement into classes. These differences depend upon the nature and energy of their movements, which again

are always proportioned to the quantum of respiration ; for upon the perfection of this function, in a great measure, depend the irritability of the muscular fibre, and the energy of the muscular action. The quantity of respiration depends upon the relative portion of blood contained at every given instant of time in the lungs, and the amount of oxygen which enters into the composition of the fluid. The quantity of blood is altogether determined by the peculiar disposition of the organs of respiration and circulation.

The organs of circulation may be double, so that all the blood conveyed by the veins from the different parts must undergo a process of circulation before it can be returned by the arteries ; or they may be simple, in which case only a portion of the blood which returns to the body passes through the lungs. This last is the case with reptiles. The quantity of their respiration, and the qualities depending on it, vary with the relative proportion of blood returned at each pulsation into the lungs.

Fishes have a double circulation, but as they respire through the medium of water, and their blood only receives the portion of oxygen in that medium, their quantity of respiration is perhaps less than that of reptiles.

In the Mammalia the circulation is double, and the respiratory process simple. The quantity of their respiration is superior to that of reptiles and fishes. But the quantity of respiration in birds is still greater than that of quadrupeds, because they also respire by various other cavities as well as the lungs. The air penetrates through their whole body, and acts upon the branches of the aorta with the same efficiency as upon those of the pulmonary artery.

From these circumstances result four different kinds of motion among vertebrated animals. Quadrupeds, in which the quantity of respiration is moderate, are formed for walking and running, and their predominant characteristic is vigour. Birds, whose respiratory system is more extensive, possess the lightness and strength of muscles necessary to support them in their flight. Reptiles, which respire more feebly, creep upon the earth, and many of them pass more or less of their existence in a state of torpor. And fishes, which move in a fluid almost as specifically heavy as themselves, are enabled to execute their movements

by an arrangement altogether different from the other. Every peculiarity of organization proper to each of these classes, and especially such as belong to motion and external sensation, have a close and necessary relation with the characters now enumerated.

CLASS I.—MAMMALIA.

Vertebrated animals with red and warm blood, breathing through lungs, viviparous, and suckling their young with milk formed in their breasts or mammae.

THE earliest writers on the Mammalia are Aristotle and Pliny, afterwards Ælian and Oppian. Ælian has a work on the nature of animals, and Oppian a Treatise on Hunting, in which he treats of wild animals. Many other writers, however, incidentally notice the animals known to them, either on account of their use to man, or their ferocity, such as Hippocrates, Cato, Columella, Cæsar, Seneca, Varro, and Athenæus.

It was not till after the revival of letters in Europe that the study of Natural History began to assume a regular form. Conrad Gesner in 1551 published a history of quadrupeds, in which, though he treated of these animals in the alphabetical order of their names, he grouped together some natural genera, as apes, horses, deer, oxen, &c. He besides made a division of oviparous quadrupeds for the tortoises, lizards, and frogs. Aldrovandus, Johnston, and others followed the steps of Gesner in the following century, without much advancing the progress of the science.

In 1693 our celebrated countryman John Ray published his *Synopsis Methodica Animalium Quadrupedum*, the first regular system of mammiferous animals, and the basis of all which have since appeared, in which he divided the Mammalia into two great classes, viz. those which have hoofs and those which have nails.

The first class is subdivided into *Solipedes*, such as the horse; those which have cloven feet, as the sheep, and animals which

have their feet divided into more than two parts, as the elephant.

The mammiferæ with cloven feet are subdivided into two sections, those which do not ruminate, as the hog, and those which ruminate:—these last form four genera, the sheep, the goat, the stag, and ox.

Among the Mammalia armed with nails, Ray distinguishes those with broad nails, resembling those of man, such as the apes, and those which have narrow and pointed nails. Among these last he separates those which have the toes divided, which he names *fissipedes*.

These fissipedes he divides further into, 1. those which have more than two incisors in each jaw, as the lion, the dog, &c.; or which have only two incisors, as the beaver, squirrel, rat, &c. 2. those which have no teeth at all, as the tamandua, or which have teeth different in number, form, and position, from those of the other Mammalia, such as the hedgehog, the mole, the sloth, &c.

To Ray succeeded other writers who endeavoured to improve the study of Natural History by a proper arrangement of its objects. Among these was Seba, whose figures make his work still a desirable addition to the library of the naturalist. But all these were forgotten in the attention which was attracted by the publication of the system of the celebrated Linnæus, whose writings were destined to form an era in the science of Nature. His sagacity enabled him to fix the basis of the classification of its objects upon a proper basis, his genius freed the study of its chief difficulties, and he created a language appropriated to all its wants. The first edition of the *Systema Naturæ* was published in 1735, the second in 1737; and its author lived to see it undergo a twelfth impression, and unite the suffrages of Europe in its favour. As the arrangement of the Mammalia by Linnæus forms the basis of most of the modern systems, it may be proper to give an outline of it in this place.

The Mammalia, which constitute his first class, is divided into seven Orders, the characters of which are derived from the number, situation, and form of the teeth. These teeth in the Mammalia are of three kinds, viz. the *incisores* or cutting teeth—the *canini* or dog-teeth—and the *molars* or grinders.

- I. PRIMATES. Fore-teeth cutting, upper four parallel; tusks solitary; mammae two, pectoral; feet used as hands; nails flattened, oval; food fruits, except a few which use animal food.
- II. BRUTA. Fore-teeth in either jaw none; feet with strong hoof like nails; motion slow; food chiefly vegetables.
- III. FERÆ. Fore-teeth conical, usually six in each jaw; tusks longer; grinders with conic projections; feet with claws; claws subulate; food carcases, and preying on other animals.
- IV. GLIRES. Fore-teeth cutting, two in each jaw; tusks none; feet formed with claws for running and bounding; food, bark, roots, vegetables, &c. which they gnaw.
- V. PECORA. Fore-teeth cutting, upper jaw none, under jaw many; feet hoofed, cloven; food, herbs which they pluck; chew the cud; stomachs, four.
- VI. BELLUÆ. Fore-teeth obtuse; feet hoofed; motion heavy; food vegetables.
- VII. CETÆ. Pectoral fins instead of feet; tail horizontal, flattened; claws none; teeth cartilaginous; nostrils a fistulous opening in the anterior and upper part of the head; food mollusca and fish; inhabit the ocean.

The example of Linnæus was not without its effect in leading others to attempt the improvement of Natural History. Between the publication of the first and twelfth edition of the *Systema Naturæ*, many authors made their appearance, who, emulous of his fame, endeavoured to share or divide the reputation of the author. Among these was the Comte de Buffon, who, while Linnæus described the mammiferous animals in the severe and simple language of science, attracted the attention of all classes of readers to the subject by his less exact but more brilliant colouring. The first volumes of the *Natural History* of this celebrated author appeared in 1749. Disregarding systematic order, he supplied its place, in detailing the manners of the various races, by an enthusiastic and powerful eloquence, which, however, has too often led to exaggeration, and unconsciously seduced him to transfer the passions of men to the actions of animals.

J. T. Klein, in 1751, published his *Quadrupedum dispositio brevisque historia naturalis*. In this work the Mammalia are divided into two orders, 1. those which have the foot terminated by one or more hoofs; and, 2. those which have claws or fingers. In 1756, Brisson followed by a work entitled *Le Règne Animal divisé en onze classes*, in which the Mammalia are divided

into eighteen orders and forty-two genera. In 1777, about a year before the death of Linnæus, Erxleben published a work entitled *Systema Regni Animalis*. The merit of his work is high, both in regard to the discrimination of the species and the synonymous terms. He increased the Linnæan number of genera by ten.

Next followed Gmelin's edition of the *Systema Naturæ* in 1788. This work contained all the new objects in Natural History which had been described since the publication of the twelfth edition; but the compilation was made without sufficient exercise of critical judgment, and the work is in consequence not of much authority.

Gottlieb Conrad Christian Storr, professor, published in 1780 at Tübingen a thesis, under the title of *Prodromus Methodi Animalium*, remarkable for its distinct arrangement. The leading characters are taken from the form of the feet. Boddaert, a physician in 1785, and Vicq-d'Azyr in 1792, each proposed arrangements for the classification of animals; but as these have not been generally adopted, it is not necessary to enter into the details.

Professor Blumenbach of Gottingen published a Manual of Natural History in 1807, in which he attempted to form a more natural system for the Mammalia, which he divides into nine orders, viz.

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| I. Bimana, | VI. Bisulca, |
| II. Quadrumana, | VII. Multungula, |
| III. Chiroptera, | VIII. Palmata, |
| IV. Digitata, | A. Glires, |
| A. Glires, | B. Feræ, |
| B. Feræ, | C. Bruta, |
| C. Bruta, | IX. Cetacea, |
| V. Solidungula, | |

M. Cuvier, in 1798, published his *Tableau Elementaire des Animaux*. This sketch contained the basis of classification which he afterwards developed in his *Anatomie Comparée* and *Règne Animal*. Two years afterwards appeared the first two volumes of the Comparative Anatomy; to which were added synoptic tables of all the classes of animals. In 1804, M. Desmarest published, in the 24th volume of the New Dictionary of Natural History, a

methodical table of the mammifera, founded chiefly upon the classification of Storr and Cuvier, and in which he distinguished the natural families, which, like the most part of the families established in zoology, were but the genera of Linnæus.

Between this period and 1811 many new species of mammiferous animals were discovered, for several of which it was necessary to establish new genera. Besides the many memoirs and monographs which had appeared, M. Cuvier had also published great part of his researches on fossil quadrupeds; and it thus became desirable to place in a complete system the result of all the new discoveries. This was attempted by Illiger, a Prussian naturalist, who published in 1811 a classification of Mammalia and Birds, which attracted attention for the precision of the generic characters. The Mammalia by this arrangement were divided into fourteen orders, thirty-nine families, and 125 genera; but his predilection for changing long-established and familiar names for others was felt to be an unnecessary load on the memory.

M. Blainville followed Illiger in 1816 by the prodromus of a new systematic distribution of the animal kingdom; and Baron Cuvier, in his important work entitled *Le Règne Animal distribué suivant son organization*, published in 1817, brought forward his arrangement, improved by the discoveries which had been made since the interval of its first publication, and by the lights which comparative anatomy threw on the structure of the animal system.

This work was followed, so far as regards the Mammalia, by the *Mammalogie* of A. G. Desmarest, written for the French *Encyclopedie*, and published in 1820-1822. This excellent work, founded on the classification of Cuvier, and including every species discovered from the period of the publication of the *Règne Animal*, leaves little to be desired as far as regards this important class. And finally, an English translation of Cuvier's work, including much valuable matter, and describing many new species, by Mr Edward Griffith and others, and accompanied by excellent figures, appeared in 1827.

As the high character of Baron Cuvier as a naturalist and comparative anatomist, has acquired for his writings the suffrages

of Europe, in the following elementary summary the arrangement of the *Règne Animal* is chiefly followed.

The Mammalia are placed at the head of the animal kingdom, not only because it is the class to which man, considered in his animal structure, belongs, but also because the Mammalia enjoy the most numerous faculties, the most delicate sensations, and the most varied powers of motion. As the quantity of respiration is in mammiferous animals moderate, they are generally formed for walking, and in consequence, all the articulations of their frame have defined forms which determine their motions.

Some of the Mammalia, however, can raise themselves in the air by means of elongated limbs connected by extensible membranes; others have their limbs so much shortened that they can move with facility only in water; but these circumstances by no means exclude them from the class to which they are allied by other essential characters.

All the Mammalia have the upper jaw fixed to the cranium; the lower is composed of two pieces articulated by a projecting condyle to a fixed temporal bone. The neck is composed of seven, and in one species of nine vertebræ. The anterior ribs are attached to a sternum, formed of a number of pieces, placed vertically. Their anterior extremity commences at the scapula, which is not articulated to any other bone, but simply suspended in the muscular attachments, and often resting on the sternum by an intermediate bone, denominated the clavicle. This extremity is continued by an arm, a fore-arm, and a hand, which last is formed of two rows of little bones called the carpus, of another row named the metacarpus, and of fingers, each composed of two or three bones called phalanges.

With the exception of the Cetacea, all this class have the first part of the posterior extremity fixed to the spine. This part, in the form of a girdle or basin, is named the pelvis. In youth it is divided into three pairs of bones,—the *os ilium*, which is attached to the vertebral column; the *os pubis*, which forms the anterior part; and the *ischium*, which forms the posterior portion. At the junction of these three bones is the cavity where the bone of the thigh is articulated, to which again is joined the leg, composed of two bones, the *tibia* and the *fibula*. This ex-

tremity is terminated by the foot, which is composed of parts analogous to the hand, viz. a tarsus, metatarsus, and toes.

The head in the Mammalia is always articulated by two condyles upon the atlas or first vertebra. The brain is composed of two hemispheres, united by a medullary lamina called the *corpus callosum*, and contains two ventricles, enclosing four pairs of tubercles, called *corpora striata*, the *thalami optici*, *nates*, and *testes*. Between the *thalami optici* is a third ventricle communicating with the fourth situated beneath the cerebellum. The *crura* of the cerebellum form always under the *medulla oblongata* a transverse prominence called *pons Varolii*.

The *eye*, always lodged in its orbit, is protected by two eyelids and a vestige of a third. Its crystalline lens is fixed by the ciliary process and its cellular sclerotic coat.

In the *ear* there is always found a cavity shut up by a membrane called the *tympanum*, with four little bones; a vestibule at the entrance of which one of these bones is placed, and which communicates with three semicircular canals; finally, a spiral canal termed the *cochlea*, which terminates by one of its canals in the tympanal cavity and by the other in the vestibule.

The cranium is divided into three compartments. The anterior part is formed of the two frontal bones and the ethmoid, the intermediate by the parietal and the sphenoid bones; and the posterior by the occipital bone. Between the occipital, the parietal, and the sphenoid, are inserted the temporal bones, which, to a certain extent, belong to the face.

In the foetus the occiput is divided into four parts, the body of the sphenoid into two, and three of its pairs of alæ are separate; the temporal bone into three, of which one serves to complete the cranium, another to enclose the labyrinth of the ear, the third to form the walls of its cavity, &c. These portions of the cranium unite more or less quickly, according to the species, and end by perfect union in the adult.

The face is formed by the two maxillary bones, between which the nasal canal passes. Before these are two intermaxillary, behind two palate bones, and between them descends the single plate of the ethmoid bone, named the *vomer*. At the entrance of the nasal canal are the bones which form the nose.

The molar or cheek bone of each side unites the maxillary to the temporal, and often to the frontal bone; and finally, the lachrymal cavity occupies the internal angle of the orbit, and sometimes part of the cheek.

The *tongue* in the Mammalia is always fleshy, and attached to the hyoid bone, which bone is suspended by ligaments to the cranium.

Their *lungs*, two in number, are composed of a mass of small cells, inclosed without adhesion in a cavity formed by the sides of the diaphragm, and lined by the pleura. Their organ of voice is at the upper extremity of the *trachea* or windpipe; and a fleshy continuation, named *velum palati*, establishes a direct communication between their larynx and the back part of their nostrils.

Living on the earth's surface, as do the greater part of the Mammalia, they are exposed to alternations of heat and cold, and their bodies have in consequence a covering of hair, which is thicker in the colder, and more scanty in the warmer regions. The Cetacea, which inhabit the sea, are, however, totally destitute of this covering.

The intestinal canal of the mammiferous animals is suspended by a fold of the peritonæum, called the mesentery, which contains numerous conglobate glands for the lacteal vessels. Another production of the peritonæum, named the epiploon, hangs before and beneath the intestines.

The generation of the Mammalia is essentially viviparous. The foetus after conception descends into the uterus, to the inner surface of which it is attached by means of an arrangement of vessels termed the *placenta*, through the medium of which nourishment is derived. The young for some time after birth are nourished by a particular secretion of the mother (milk,) produced in the mammiferous animals after parturition, and drawn by the young from *mammæ* or teats. It is from this last character that the term Mammalia has been applied to this Class—a character exclusively proper to them, and by which they are more easily recognized than by another external distinction.

The total number of mammiferous animals described, according to Desmarest, is about 850, including, however, many species

imperfectly ascertained and the fossil Mammalia; of which belonging to the order Quadrumana are 141,—Cheiroptera 97,—Ferae 176,—Marsupialia 47,—Rodentia 149,—Edentata 24,—Pachydermata 55,—Ruminantia 97,—Cetacea 62. Of these about 330 are frugivorous or herbivorous, 80 omnivorous, 150 insectivorous, and 240 carnivorous, in a greater or lesser degree. The number of terrestrial species domesticated by Man (but perhaps including all that are really useful) amount only to thirteen.

The essential characters of the Mammalia are taken from the organs of touch and the organs of mastication. On the first depend the power and dexterity of the animal; and from the second may be deduced the nature of its food, and the consequent structure of its digestive apparatus. On these characters are founded the division of mammiferous animals into Orders.

The degree of perfection of the organs of touch may be estimated according to the number and mobility of the fingers, and according to the greater or less depth with which their extremities are covered by the nail or hoof. A hoof, for instance, which envelopes that part of the extremity which would otherwise touch the ground, blunts the feeling, and renders the foot incapable of seizing. The opposite extreme is, when only a single lamina covers the upper surface of the end of the finger or toe, leaving to the other all its sensibility.

The nature of the food may be judged of by the appearance of the molar teeth, to the form of which the articulation of the jaws always corresponds. For cutting flesh the teeth require to be edged like a saw, and the jaws to close vertically like scissors. To bruise grains or roots it is requisite that the molars have a flat crown; that the jaws should move horizontally as well as vertically; and that the teeth should be composed of parts of unequal hardness, to give them the necessary inequalities for this operation. The hoofed animals are all necessarily herbivorous, and possess teeth of this description, since the structure of their feet precludes them from seizing living prey.

Animals with unguiculated toes or fingers, on the contrary, are susceptible of more variety in their modes of subsistence;

for besides the form of the molar teeth, they differ materially among themselves in the mobility and delicacy of their toes or fingers. There is one characteristic, however, which exercises a mighty influence on the dexterity of the animals possessed of it, and which multiplies or greatly varies their modes of action. This is the faculty of opposing a thumb to the other fingers, and of thus being enabled to seize with facility the most minute objects. This opposition of a fifth member to the other four constitutes what is properly called the *hand*, an organ which is carried to the highest degree of perfection in Man, in whom alone the anterior extremities are free.

From these various combinations, which strictly determine the nature of the different mammiferous animals, Cuvier has arranged the Class into the following Orders.

I. BIMANA, (with two hands) of which man is the type and only species, is at the head of the unguiculated species, and is distinguished zoologically by possessing hands at the anterior extremities, the posterior being employed to sustain him erect, and three kinds of teeth.

II. QUADRUMANA, with four hands at the four extremities, and three kinds of teeth.

III. CARNIVORA, Carnivorous, or feeding more or less on animal food. This order has no thumb capable of free motion and opposable to the toes; three kinds of teeth. It is divided into four families, viz. *Cheiroptera*, *Insectivora*, *Carnivora*, and *Marsupialia*.

IV. RODENTIA, or Gnawers: (*Glires*, Lin.) The animals of this order have the extremities little different from those of the carnivora; but they want the canine teeth, and their incisors are adapted to a kind of mastication peculiar to themselves.

V. EDENTATA, without teeth. This order includes animals which have no incisors, or cutting teeth; some of them even want the canine teeth; and others have none at all. Besides this their toes are contracted and buried in large and often crooked nails.

This distribution of the unguiculated animals would be perfect, and would form a regular series, if New Holland had not recently furnished a collateral chain composed of animals with

abdominal sacs for their young. Though the different genera of these are thus connected in this one particular, yet in the form of their teeth some are found to correspond with the Carnivora, others with the Rodentia, and others resemble the Edentata in the structure of their teeth and the nature of their food.

VI. PACHYDERMA, or thick-skinned animals. This order includes all the quadrupeds with hoofs, except the ruminating animals, though the elephant is only remotely connected with this group.

VII. RUMINANTIA, ruminating animals, (*Pecora*, Lin.) These animals form a very natural family, and are distinguished from all other quadrupeds by their cloven feet, the want of true incisors in their upper jaw, and by their having four stomachs.

VIII. CETACEA, Whales. Mammalia which have no distinct posterior extremities. These are the *warm-blooded fishes* of the ancients, which, to the strength of the mammiferæ, unite the advantage of being supported by water, and thus form the most gigantic of animals.

Since the publication of the *Régne Animal*, Latreille and others have made a separate order of the Cheiroptera, the first of the four families into which Cuvier divides his *Carnassiers*; and this separation seems natural and proper, from the other families of the Order having their mammae ventral, while the Cheiroptera, like the Quadrumana, are distinguished by pectoral mammae. Cuvier himself suggests the propriety of arranging the Marsupial animals, forming the fourth family of the same order, into a separate group. In the following pages the arrangement will therefore stand thus:—

ORDER I. BIMANA,

II. QUADRUMANA,

III. CHEIROPTERA,

IV. FERÆ,

V. MARSUPIALIA,

ORDER VI. GLIRES,

VII. EDENTATA,

VIII. PACHYDERMA,

IX. RUMINANTIA,

X. CETACEA.

ORDER I.—BIMANA.

TEETH of three kinds ; the posterior extremities proper for walking ; the anterior furnished with hands ; nails flat ; body vertical ; two pectoral mammæ ; stomach simple ; orbital and temporal fossæ distinct.

Genus, Homo. Incisors $\frac{4}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{2}-\frac{5}{2} = 32$.

Species, Homo sapiens. Man.

MAN stands alone in the order and genus to which naturalists have referred his species. Differing widely in physical conformation from all other classes of animated beings, and distinguished by reason and the power of speech, this wonderfully constructed being seems the bond of connection between the material and immaterial worlds. Possessed of mental powers which raise him beyond the level of the surrounding creation, and connect him with higher orders of existences, Man is the only being who looks forward to futurity, and intuitively perceives his connection with and dependence upon the great Source of Intelligence. While the inferior animals enjoy unalloyed the blessings of life and present enjoyment, Man combines the past, the present, and the future in his calculations of happiness ; and while some parts of his organization connect him with the creatures around him, and sober his rule over beings with animal feelings of pleasure and pain as acute as his own, his intellectual powers, unfettered by the material organs which are their instruments, trace the Divinity in all the parts of creation. Hence has arisen the religious feeling among every tribe of human beings, however rude ; and Man alone seems to connect himself with the Great Author of his being through the medium of intellectual homage, and worships, according to his conceptions of that Almighty Being, the Creator and Preserver of all.

While reason places Man at such an infinite distance from the inferior animals, the faculty of articulate speech, and an artificial language, widens the barrier still farther ; for although some of the animals possess the power of articulation in a considerable degree, and can communicate by natural signs significant to those of their own species, they totally fail in those powers which enable Man to classify objects, and to employ sounds or signs as an instrument of thought. Brutes possess indeed the powers of sensation, perception, and memory, and seem to be capable of intellectual operations to a certain extent ; but their action is extremely limited, and bounded to the supply of their bodily wants ; and though susceptible of a species of education, their imitative powers are neither subservient to the improvement of the individual nor the species.

The faculty which seems to direct the inferior animals in most of their operations, essentially different from any thing like human intelligence, is called *instinct*. This wonderful faculty, surer in its

limited aims than reason, bears, however, no proportion to the general intelligence of the animals which exercise it ; for it has been remarked, that those in whom the instinctive propensity displays the greatest seeming wisdom and contrivance, are upon other occasions remarkably deficient in sagacity.

The physical structure of Man also widely separates him from the other portions of the mammiferous class. But these variations in form and proportion are neither so prominent nor so totally different in character from the other animal structures, as to account for the superiority which he enjoys. Destined to be nourished on substances used in common by other animals, the mechanism of his frame must so far correspond with theirs, as to be able to convert these substances to the fluids which support his animal life ; and his organs of sensation must necessarily be analogous in some degree to those of beings on whom the material world is destined to make similar impressions. But no material organs which Man possesses, abstracted from the mind of which they are but the instruments, can account for his intellectual supremacy ; and all those hypotheses which would trace Man's intellectual and moral powers from the absolute or relative size of the brain or other material organs, have miserably failed in connecting mind with matter, or thought with organic structure.

The structure of the human frame, however, is wonderfully adapted to the various purposes for which it is destined ; and even physically considered, seems the worthy habitation of a being placed at the head, and with the control, of animated nature. Man, indeed, considered as an animal, is the only one which walks erect in a vertical position ; the only one with hands at the anterior extremity, distinct from the organs of locomotion, and free for executing his purposes ; and no other has like him vertical incisive teeth in the lower jaw and a projecting chin. Contrary to what is found in any other mammiferous animal, the structure of his body demonstrates that man is destined to walk erect. The foot is entirely different from the posterior hands of apes, and furnishes a larger and firmer base than that of any other animal. In relation to the foot the leg holds a rectangular or vertical position. The muscles which hold the foot and thigh in an extended state are extremely vigorous, and produce the projection of the calf and the thickening of the buttock. The flexors of the leg are attached very high to allow the extension of the knee. The pelvis is large, which, besides separating the extremities widely, gives a pyramidal form to the trunk favourable to equilibrium ; and the articulation of the head is strictly central in relation to its own bulk.

It would be impossible for Man, even if he desired it, to walk on the four extremities, his feet being short and almost inflexible, and the great length of his thigh would bring his knee to the ground. His shoulders, also, being too much separated, and his arms too far extended from the central line, would form a very ineffectual support for the upper part of the body. The great muscle, which, in

quadrupeds, like a girth, holds the body suspended between the shoulders, is smaller in man than among them. The head of man is also heavier, and its means of support weaker ; for there is neither a cervical ligament, nor such an arrangement of vertebræ as would prevent its bending forward. The arteries, besides, which supply the human brain not being subdivided, as in most quadrupeds, the blood necessary for an organ of such volume would be poured in too copiously and rapidly, if he should affect the horizontal position. In short, Man is the only biped and bimanous animal ; and his locomotive organs being placed at one extremity, leaves that admirable instrument, the hand, free for the execution of purposes which distinguish him from every other animated being. This instrument, which derives so many advantages from being at liberty, possesses as many more from the wonderful mechanism of its structure. The thumb, longer in proportion than that of apes, affords greater facility for seizing and holding small objects ; all the fingers have separate movements ; and the nails being placed at one side of the extremity, form a support for the organ of touch without injuring its delicacy. The arms to which those hands are affixed possess a strong point of attachment in the large scapula, the powerful clavicle, and the general arrangement of their articulation.

According to Cuvier, no quadruped is comparable to man for the magnitude of the hemispheres of the brain in proportion to that of the face. The form of the cranium announces this magnitude of brain, while the comparative smallness of the face displays how little that part of the nervous system which influences the external senses is predominant in the human species. Though the external senses of man are less energetic than in some other animals, they are, however, extremely delicate, and admirably balanced amongst themselves. His eyes are directed forwards, and thus, though he does not see on both sides at once like most quadrupeds, there is a greater unity in the result of the visual operation. Though his ear possesses but little mobility or extent, yet of all animals he can best distinguish the various degrees of intonation. His nostrils, though more complicated than those of apes, are less so than those of other animals,—yet man appears to be the only creature whose sense of smell is sufficiently delicate to be affected by unpleasant odours. Lastly, The perfection of his touch results both from the delicacy of his external integuments, the absence of all insensible parts, and the form of his hand, so admirably constructed to adapt itself to the slightest inequalities of surface.

As man, when compared with other animals, displays a striking difference in the relative proportions of the cranium and face, a theory has been formed from these proportions to account for intellectual differences ; and it has been remarked, that, among the brute creation, those animals which approach to man in these proportions also combine the largest portion of intelligence and docility. Thus an oblique line drawn from the greatest projection of the forehead to that of the upper maxillary bone, and a horizontal line drawn

backwards from beneath the base of the nostrils, forms what is called the facial angle, and the number of degrees in this angle gives the measure of the relative prominence of the jaws and forehead. In the human race the facial angle approaches nearly to a right angle, and the obliquity of the line has been observed to increase as we descend the scale of animated beings, till at last the cranium and face form parts of one horizontal line.

This theory of comparative intelligence founded on the facial line, proposed by Professor Camper, corroborates in some measure the idea that the intelligence of animals may be estimated by the comparative size of the brain. At the same time it must be observed, that in many animals the facial line does not measure the actual prominence of the brain but that of the frontal sinuses, which, in the Carnivora, many of the Ruminantia, and the elephant, elevate the facial line considerably. In the human race, however, and the quadrumanous animals, where the frontal sinuses are inconsiderable, this elevation may be conceived to arise for the most part from the greater capacity of the cranium. In man the facial angle varies from 65° to 85° in adults, while in children it reaches to 90° , a sufficient proof, it has been observed, of the inadequacy of this standard as a measure of intellect.

Fruits, roots, and succulent vegetables, appear to be the natural food of man. His hands afford him facility in procuring these, and his short and comparatively weak jaws, his canine teeth not projecting beyond the line of the others, and his tuberculous molar teeth, would not permit him to feed on herbage or devour flesh, unless those aliments were previously prepared by the culinary process. But once in possession of fire, and assisted by the arts of his own invention, to take animals by stratagem or to kill them at a distance, the whole living world is converted to his use, and the means of multiplying his species are infinitely augmented.

The organs of digestion in man are in conformity with those of mastication. The stomach is simple, the intestinal canal of moderate length, the large intestines well-marked, the cœcum thick and short, and augmented by a thin appendage; the liver is divided into two lobes and a smaller one; and the epiploon hangs in front of the intestines, extending even into the pelvis. To complete the anatomical detail as far as necessary in this place, it may be added, that the cranium is formed of eight bones; one frontal, one ethmoid, one sphenoid, and one occipital—all on the mesial plane, and one parietal and one temporal on each side of this plane. The bones of his face are fourteen in number; two maxillary and two malar, each of which is attached to the temporal of the same side by a process called the zygomatic arch; two nasal bones, two lachrymal at the internal sides of the orbits, two palate bones, two inferior turbinated bones within the nostrils, the vomer between the nostrils, and lastly, the single bone of the lower jaw. Each jaw has sixteen teeth; four incisors in the middle, two pointed canine teeth at the corners, and ten molar teeth with tubercular crowns, five on each side, making in all thirty-two.

The vertebral column or spine is composed of thirty-two vertebrae, seven of which are denominated cervical, twelve dorsal, five lumbar, five sacral, and three coccygeal. Of the ribs seven pair (called true ribs) are attached to the sternum or breast-bone by cartilaginous productions ; the other five pair are called false ribs. The scapula has at the end of its projecting ridges a tuberosity called the acromion, to which the clavicle is attached, and above its articulation a point named the coracoid, for the attachment of certain muscles. The radius turns completely on the ulna, in consequence of the manner in which it is articulated with the humerus. The carpus has eight bones, four in each row ; the tarsus seven ; those of the rest of the hand and feet correspond with the number of toes and fingers.

The human race have rarely more than one child at each birth, and twins do not occur in more than a single instance out of five hundred. The period of gestation is nine months. The child at birth is generally eighteen inches long, more than one-fourth of its destined stature ; one-half is attained at two years and a half ; and three-fourths at the age of nine or ten. The growth generally ceases about eighteen. The milk-teeth begin to shoot out a few months after birth ; at two years old they are twenty in number, and they fall successively towards the seventh year, to be replaced by others. Of the twelve molar teeth which do not drop out, four appear at about the age of four years and a half, four at nine years, and the last four do not appear sometimes till the twentieth year. Puberty is usually manifested by external signs, in girls at the age of ten, twelve, or fourteen, and in boys from twelve to sixteen. The male of the human species seldom exceeds six feet in height, and is rarely under five feet ; the female is generally a few inches less.

Scarcely has the body attained its destined height when it begins to increase in bulk. Fat accumulates in the cellular tissue ; the different vessels are gradually obstructed ; the more solid parts grow rigid ; and after a life more or less long, more or less agitated by physical or moral pleasure and pain, old age arrives, and in its train decrepitude and death. While a few pass the limit of a hundred years, the greater part of the race perish long before this period by diseases or accidents, or even by old age itself.

The greater part of animals are able at the moment of their birth to provide for their principal wants ; some of them, indeed, as Fishes, Reptiles, almost all Insects, and the Mollusca, never know their parents. The Mammalia in general, and the Birds, remain for some weeks in a state of great helplessness, but towards the eighth or tenth day their senses are all developed, and some of them are even then able to follow their mother. But Man, on the contrary, is at birth the most helpless being imaginable ; even his senses, which require a kind of education, are not developed till towards the fortieth day, when the little being also begins to smile, and to know those who approach him :

“ ——— risu cognoscere matrem.”

When about an year old he begins to lisp the simplest sounds ; in about fifteen months he is able to walk ; speaks generally in about a year and a half ; but it is not till after a long period of training that the infant man is qualified to procure for himself the necessaries of animal life. An intellectual as well as a physical education is therefore necessary, and the foundation is thus laid for one of the most natural as well as permanent bonds of attachment. The equality of the sexes in number point to monogamy as the kind of union most proper and natural for the human species. The long education necessary permits the parents to have other children in the interval ; and thus, according to Cuvier, the perpetuity of the conjugal union appears to be a law decreed by Nature. The long period of infantine imbecility gives rise to another natural law, namely, the subordination of each individual family ; and this again leads, by a necessary consequence, to the whole system of social order. This family connection, expanded in the progress of time into the bonds of tribes and nations, has wonderfully strengthened the intellectual resources of the human race ; and has enabled man to subsist under every variety of temperature, and to cover the face of the whole earth with beings similar to himself.

In other respects Man appears to possess nothing resembling the instinct of animals. He is not stimulated to any regular or continuous exertion of industry by an uncontrollable impulse. His knowledge is the consequence of his own sensation and reflection, or of those of his predecessors ; and from these results, transmitted by language or example, and applied to his various wants and enjoyments, have originated all the arts. Language and letters, by affording the means of preserving and communicating acquired knowledge, hold out to the human race indefinite sources of improvement.

Of the numerous varieties of the human race Cuvier mentions three as eminently distinct, viz. the white or *Caucasian*, the yellow or *Mongolian*, and the negro or *Ethiopian*. Blumenbach conceives they may be divided into five distinct varieties, viz. the Caucasian, Mongolian, Ethiopian, American, and Malayan ; and other writers have farther subdivided these as their family characteristics were more or less marked.

1. *The Caucasian variety* includes all the Europeans, with the exception of the Laplanders, and the inhabitants of the western and northern parts of Asia. They have the face oval ; facial angle 85° ; forehead high and expanding ; cheeks coloured red ; hair long, brown, but varying from white to black.

2. *The Mongolian variety* inhabits eastern Asia, Finland, and Lapland in Europe, and includes the Esquimaux of North America. They have a broad and flat olive-coloured face, with lateral projection of the cheek-bones ; facial angle 75° ; oblique and narrow eyes ; hair hard, straight, black ; beard thin.

3. *The Ethiopian variety*, inhabiting the middle parts of Africa, are black in a greater or less degree, with black woolly hair, jaw projecting forward, thick lips, and flat nose ; facial angle 70° .

4. *The American variety*, comprising all the Americans except the Esquimaux, are mostly tan or reddish copper-coloured, with prominent cheek-bones, short forehead, flattish nose, straight coarse hair, and thin beard.

5. *The Malayan variety* includes the inhabitants of the islands in the Indian Ocean and Polynesia. They are of a brown colour, from a clear mahogany to the darkest clove or chesnut brown, with thick black bushy hair, a broad nose, and wide mouth.

To one or other of these strongly marked families all the other varieties of the human race may be traced; and these in their turn may be referred to certain hereditary conformations, modified by food, soil, and climate, which have separated the members of one family, long prior to the era of written records.

Some French naturalists have endeavoured to raise the varieties now observable among the human race into different species; but, as Cuvier justly remarks, the indiscriminate sexual intercourse and consequent production of an offspring capable of propagation prove mankind to be but a single species. And it is remarked by Blumenbach, that all national differences in the form and colour of the human body are not more remarkable, nor more inconceivable, than those by which varieties of so many other organized bodies, and particularly of domestic animals, arise as it were under our eyes.

In considering the peculiarities which distinguish man from the brute creation, his capability of inhabiting every climate and sustaining every degree of heat and cold, deserves to be noticed. While the geographical range of most animals is extremely limited, the physical and intellectual powers of man enable him to create a climate of his own in every degree of latitude; and while the Indian of Canada may sleep upon the snow with impunity with the thermometer at 40° below zero, the natives of Sierra Leone suffer unhurt the heat of a vertical sun with the thermometer above 100° . And as the physical powers and intellectual resources of Man enable him to occupy the whole surface of the globe, his capacity of living on every species of food renders him in the widest sense of the word omnivorous. The continued use of animal food is as natural and wholesome to the inhabitants of the Arctic regions, where it is impossible to raise vegetables, as a mixed diet is to the Englishman; and vegetable food within the tropics is necessary from the exuberance of this part of the creation, and the comparative scarcity of those gregarious animals on which man subsists in other latitudes.

ORDER II.—QUADRUMANA.

THREE kinds of teeth, incisors, canines, and molars; four extremities terminated by hands, with the thumb separate from the other fingers, and more or less opposable to them; fingers long and flexible; two or four pectoral mammæ; clavicles

complete; bones of the arm and leg distinct, and susceptible of the motions of pronation and supination; male organs of generation external; stomach membranous, simple; intestines of medium length; a little cæcum; orbital and temporal fossæ distinct.

This order feeds on fruits, roots, and insects. They are intelligent, agile, lively, and petulant, destined by their organization to live on trees, where they are almost constantly found. Inhabit the warm parts of Asia, Africa, and America.

FAMILY I.—SIMIÆ.

Form approaching more or less to that of Man; four inclined incisors in each jaw; nose more or less prominent; nostrils more or less separated from one another; two pectoral mammæ; orbital and temporal fossæ distinct.

If the conformation of the body always implied corresponding intellectual attributes, the *Simiæ* or apes should approach the nearest to man. But this is not found to be the case; and though the family of apes have, like man, their anterior hands free, and opposable thumbs, though in a less degree, yet it is not found that their sagacity is superior or equal to some other tribes of mammiferous animals. The structure of their body, indeed, enables them to perform many movements similar to man, but this, when it approaches the usages of the human race, is in general the mere effect of imitation or education in individuals withdrawn from their kind. Possessed of hands at both extremities, capable, were they directed by intelligence, of turning the soil or the inhabitants of the forest to their use, they are inferior in sagacity to the beaver and many other animals which live in society. The social instinct of the apes indeed seems limited to the tendency which frugiverous animals have in general to live in wandering troops, for the purposes of mutual protection.

The whole structure of apes marks them as essentially formed for climbing trees, and it is in forests, accordingly, that they are chiefly found. Their gait on the ground and on all-fours as quadrupeds is awkward and by leaps; and their head not being placed in equilibrium on the spine as in man, their pelvis being small, and the muscles of the thigh being attached lower in the leg, prevents their assuming the erect position. Their very long arms, and hands at both extremities, are, on the contrary, admirably calculated for their mode of life.

The family of apes are lively, petulant, and extremely lascivious. They possess the talent of imitation to a great degree, and hence the ancient generic denomination of *Simiæ* from *simulare*, to imitate. MM. de la Condamine and Bouguer, when making their observations in South America on the Figure of the Earth, were annoyed by domesticated apes looking through their telescopes, planting signals, running to the pendulum, taking the pen to write, and imitating all the actions of these learned astronomers. Their intelligence is not, however, greater than that of the dog, though their imitative actions appear advantageously from their particular conformation. Their senses of touch, of smell, and of taste, are particularly acute, and seem to direct all their appetites, which are sensual and gross in almost all the species. The disgusting resemblance to the human countenance which the ape presents, was remarked by Ennius the old Roman poet in the following line:

“*Simia quam similis turpissima bestia nobis.*”

Apes bring forth one or two young at a birth, after a gestation of from five to seven months, according to the species. The females carry their young in their arms or upon their backs, offer them suck, amuse them, and sometimes strike or bite them when they are dissatisfied. Among the Sapajous or American apes with prehensile tails, the young seat themselves upon the haunches of the mother, preserving their equilibrium by their tail. The males are polygamous in the smaller species, but often monogamous in the largest. Their geographical range is extremely limited, and they are only found under the tropics in both hemispheres.

1st TRIBE.—APES OF THE OLD CONTINENT.

(Simiæ Catarrhini, Geoff.)

Five molars on each side in both jaws, crowned with blunt tubercles; nostrils approaching, having between them only a thin partition; tail none, or short, or long, never prehensile; often with cheek-pouches and callosities. Inhabits Africa, India, and the neighbouring islands.

Gen. 2. TROGLODYTES, Geoff.—*Pithecus*, Cuv.—*Simia*, Lin.

Incisors $\frac{4}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 32. Canines little projecting, contiguous to the incisors and molars, as those of man; head rounded; muzzle little projecting; superciliary ridge prominent; facial angle 50° ; arms almost proportioned to the legs, reaching to the bottom of the thighs; thumbs long and opposable; no tail, cheek-pouches, intermaxillary bones, nor callosities on the buttocks.

T. niger, Desm. (*Simia Troglodytes*, Lin.) The Chimpanzé. Arms of moderate length; fur black; mouth and ears large; canine teeth scarcely surpassing the incisors; lips with some stiff hairs; belly flat and large; buttocks naked and not callous; body covered with long black and thinly scattered coarse hair, that on the shoulders longer than elsewhere; hair on the fore-arm directed towards the elbow; face naked, of a brown colour, with the exception of the cheeks, which have hair similar to that of the body; belly almost naked. About three feet in length.

The Chimpanzé, about which so many fables have been related, most resembles man in organization. It lives in troops, and can use a stick to lean upon or for defence. It is very intelligent, and susceptible of considerable education. It is sometimes said to pursue negroes. If there be any truth in the statements of travellers, regarding the great wild man of the woods of Africa, there is little reason to doubt that this formidable animal will turn out to be the adult Chimpanzé, as all the specimens brought to Europe displayed their nonage by their teeth and other indications. Inhabits Africa, particularly on the coasts of Angola and Congo.

Gen. 3. PITHECUS, Cuv. Geoff.—*Simia*, Lin.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 32. Canine teeth a little longer than the others; molars more square than in man, with tubercles more pronounced; head rounded; no superciliary ridge, at least in young individuals; facial angle 50° to 65° ; arms excessively long; thumbs pretty short; no tail or cheek-pouches; callosities on the buttocks in some species; ears rounded, similar to those of man.

This genus approaches nearest to man by their intelligence. Inhabits Cochinchina, Malacca, Borneo, and the islands of the Indian Archipelago.

Sub-Gen. 1.—ORANGS, properly so called—No callosities on the buttocks.

P. satyrus, Desm. (*Simia satyrus*, Lin.—*Pongo Wombii*, Desm.)
The Great Orang-outang. Fur brownish-red; face prolonged before, nearly bare, and of a dark lead-colour; eyes small, approaching; nose very flat, with two oblique nostrils; muzzle projecting, ears small, resembling those of man, but wanting the lower lobe; opening of the mouth large; canine teeth a little projecting; the two middle upper incisors twice the breadth of the lateral ones; arms long; nails similar to those of man, those of the thumb shorter and narrower than the others; thumb reaching to the first joint of the index finger; hair of the head of a reddish brown; beard chesnut colour; hair of the fore-arm directed towards the elbow; breast and belly nearly bare; no callosities or tail.

The history of this animal, confounded with relations of other species, has hitherto been involved in much obscurity. The animal described by naturalists under the name of *S. satyrus*, specimens of which have occasionally been seen in Europe, and the Pongo of Wurm, seem only, as Cuvier conjectured, to be the young of the gigantic animal described and partly figured by Dr Clarke Abel. From the measurement of the shrivelled and dried skin, that gentleman makes its height to exceed seven feet and a half, though the youth of the animal was ascertained by the state of its teeth, and by the apophysis of the bones of its hands and feet being incompletely ossified.

“The face of this animal,” says Dr Abel, “with the exception of the beard, is nearly bare, a few straggling short downy hairs being alone scattered over it. It is of dark lead-colour, excepting the margins of the lips, which are lighter. The eyes are small in relation to those of man, and are about an inch apart. The eyelids are well fringed with lashes. The ears are $1\frac{1}{2}$ inch in length, and barely an inch in breadth, are close to the head, and resemble those of man, with the exception of wanting the lower lobe. The nose is scarcely raised above the level of the face, and is chiefly distinguished by two nostrils, $\frac{2}{3}$ of an inch in breadth, placed obliquely side by side. The muzzle projects in a mammillary form. The opening of the mouth is very large. When closed, the lips appear narrow, but are in reality half an inch in thickness. The hair of the head is of a reddish brown, grows from behind forwards, and is five inches in length. The beard is handsome, and appears to have been curly in the animal’s lifetime. Its colour is lighter than that of the head, approaching to a light chestnut. The beard is about three inches long, springing very gracefully from the upper lip, near the angles of the mouth, in the form of mustachios, whence descending, it mixes with that of the chin, the whole having at present a very wary aspect. The face of the animal is much wrinkled.

“The palms of the hands are very long, are quite naked from the wrists, and are of the colour of the face. Their backs are covered with hair to the last joint of the fingers, and this inclines backwards towards the wrists, and then turns directly upwards. All the fingers have nails, which are strong, convex, and of a black colour. The thumb reaches to the first joint of the fore-finger.

“The soles of the feet are bare, and of the same colour as the hands; they are covered on the back with long brown hair to the last joint of the toes. The great toe is set on nearly at right angles to the foot, and is relatively very short. The original colour, however, of the hands and arms, and the soles of the feet, is somewhat uncertain, in consequence of the effect of the spirit in which they have been preserved.

“The skin itself is of a dark leaden-colour. The hair is of a brownish red, but when observed at some distance, has a dull, and in some places, an almost black appearance; but, in a strong light, it is of a light red. It is in all parts very long; on the fore-arm it is directed upwards. On the upper arm its general direction is downwards, but, from its length, it hangs shaggy below the arm. From the shoul-

ders, it hangs in large and long massy tufts, which, in continuation with the long hair on the back, seems to form a continuous mass to the very centre of the body. About the flanks the hair is equally long, and, in the living animal, must have descended below the thighs and nates. On the limits, however, of the lateral termination of the skin, which must have covered the chest and belly, it is scanty, and gives the impression that these parts must have been comparatively bare. Round the upper part of the back it is also much thinner than elsewhere, and small tufts at the junction of the skin with the neck are curled abruptly upwards, corresponding with the direction of the hair at the back of the head."

This animal was killed on the coast of Sumatra by a party who had landed for the purpose of watering. Captain Cornfoot, the commander of the vessel, in his relation of its capture to Dr Abel, dwelt much "upon the human-like expression of its countenance, and especially on the beautiful arrangement of its beard. He also obliged me with some account of its capture, as reported to him by his officers, and feelingly described the piteous action of the animal on being wounded, and of its apparent tenacity of life. It seems that, on the spot where this animal was killed, were five or six trees, which occasioned his hunters great trouble in procuring their prey; for, in consequence of the extreme agility and power of the animal in springing from branch to branch, and bounding from one tree to another, his pursuers could not fix their aim, until they had cut down all the trees but one. When thus limited in his range, the orang-outang was shot, but did not die till he had received five balls and the thrust of a spear. One of the first balls probably penetrated his lungs, as he, immediately after the infliction of the wound, slung himself by his feet from a branch, with his head downwards, and allowed the blood to flow from his mouth. On receiving a wound he always put his hand over the injured part, and distressed his pursuers by the human-like agony of his expression. When on the ground, after being exhausted by his many wounds, he lay as if dead, with his head resting on his folded arms. It was at this moment that an officer attempted to give the *coup de grace* by pushing a spear through his body, but he immediately jumped on his feet, wrested the weapon from his antagonist, and shivered it in pieces. This was his last wound, and last great exertion, yet he lived some time afterwards, and drank, it is stated, great quantities of water. Captain Cornfoot also observes, that the animal had probably travelled some distance from the place where he was killed, as his legs were covered with mud up to the knees."—*Brewster's Journ.* iv. 194.

A young specimen of this animal brought to England from Java, and previously described by Dr Abel in his Account of the Embassy to China, was allowed to wander freely about the ship and became familiar with the sailors. "They often chased him about the rigging, and when pressed he eluded his pursuers by seizing a loose rope and swinging out of their reach. At other times he would patiently wait on the shrouds, or at the mast head, till his pursuers almost touched him, and then suddenly lower himself to the deck by any rope that was near him. When in a playful humour he would often swing within arm's-length of his pursuer, and having struck him with his hand, throw himself from him." The manners of this animal were gentle, and he romped with the boys of the ship. He would entice them to play by striking them with his hand as they passed, and then bounding from them. But when excited to violent rage, he displayed his teeth, and attempted to bite those who were near him. "If repeatedly refused an orange when he attempted to take it, he would shriek violently, and swing furiously about the ropes; then return and endeavour to obtain it, and if still refused he would roll for some time like an angry child upon the deck, uttering the most piercing screams; and then suddenly starting up, rush furiously over the side of the ship and disappear. On first witnessing this act it was thought he had thrown himself into the sea; but on a search being made he was found concealed under the chains."

This animal, according to Dr Abel, neither practices the grimaces nor antics of other apes, nor possesses their proneness to mischief. Gravity, approaching to melancholy and mildness, were strongly expressed in his countenance. He soon became attached to those who used him kindly. He was fond of sitting by their side, and getting as close as possible to their persons. From the boatswain of the *Alceste*, who shared his meals with him, he learned to eat with a spoon; and might be often seen at his cabin door enjoying his coffee, quite unembarrassed by those who observed him, and with a grotesque and sober air that seemed a burlesque on human nature.

He arrived in England in August 1817, and survived his transportation till the first of April 1819, in the custody of Mr Cross at Exeter-Change. He was shedding his teeth at the period of his death. A figure of the head of this animal, drawn from a cast taken after death, is given by Mr Griffith, (*An. King.* i. 252), and the head and hands of the adult are figured in *Brewster's Journal*, iv. pl. 4.

Sub-gen. 2.—GIBBONS,—*Hylobates*, Ill.—*Callosities on the buttocks.*

P. lar, Desm. (*Simia lar*, Lin.) The Gibbon. Fur black; face surrounded with gray hairs. About sixteen inches in height; arms almost reaching the ground when the animal is erect.—Inhabits Coromandel, &c.

P. variegatus, Desm. (*Simia lar*, var. Lin.) Fur variegated with gray brown and deep gray. A third smaller than the preceding.—Inhabits the island of Malacca.

P. leuciscus, Desm. (*Simia leucisca*, Schreb.) Fur gray ash-coloured; face black; strong callosities.

Similar in form to the preceding, but having the arms longer. They sometimes walk erect, balancing themselves with their long arms upon the high branches of the bamboo in Java and the Moluccas.

P. syndactylus, Desm. (*Simia syndactyla*, Raffles.) The Siamang. Fur of a deep black, woolly, and very thick, naked under the throat; index and middle finger of the posterior hands united to the second joint.

These animals are common in Sumatra. They are generally found assembled in large troops, conducted, it is said, by a chief, whom the Malays believe to be invulnerable. Assembling at sunrise and sunset, they vie with each other in making the most dreadful cries. At all other times they appear to be perfectly quiet. When any of a troop is wounded it is abandoned to its fate, unless indeed it be a very young one. In this case maternal affection prevails, and the mother of the bleeding young will sacrifice her own life in an ineffectual attack on the enemy. Affection is also often displayed under more pleasing circumstances in the care of the persons of their young, by washing, rubbing, and drying them, in spite of the pettish cries and resistance of the little Siamang. This species is readily tamed; but, unconquerably timid, it never displays familiarity, and its submission seems rather the result of apathy than of confidence. It displays little intellectual vigour. It drinks by plunging the fingers in water and then sucking them.—*Griffith's An. King.* i. 256.

P. agilis, Desm. (*Hylobates agilis*, F. Cuv.) The Active Gibbon. Fur brown, with the back yellow; forehead very low; orbital arches very prominent; face of the male bluish black, that of the female brown.—*Mam.* 532.

Inhabits the forests in Sumatra, living in isolated couples. It is very lively, and climbs with amazing agility, but does not display much intelligence.—*F. Cuv. Mam.* liv. 32.

Gen. 4. COLOBUS, Geoff.—*Simia*, Pen. Gmel. &c.

Incisors 4, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{5}$ — $\frac{5}{5}$, = 32. Muzzle short; face naked; nostrils approaching; hands deprived of thumbs; feet with five fingers, the thumb much separated, and the fingers increasing in length from the first to the third; tail long and slender, tufted towards its extremity; cheek-pouches; callosities on the buttocks; body and legs slender.

C. polycomos, Geoff. (*Simia polycomos*, Schreb.) Full Bottom Monkey. With a mane upon the neck, shoulders, and top of the back. About three feet high. Inhabits the forests of Sierra Leone and Guinea.—*Penn. Quad. i. pl. 24.*

C. ferruginosus, Geoff. (*Simia ferruginosa*, Shaw,) Bay Monkey, Penn. Fur ferruginous; crown of the head, hands, and tail black.—*Desm. Mam. 53.*

Similar to the preceding species in its slender members, length of the tail, and form of the fingers.

C. Temminckii, Kuhl. Black above, on the shoulders and outside of the thighs. About twenty inches in height.—*Desm. Mam. 53.*

Gen. 5. SEMNOTITHECUS, F. Cuv.—*Cercopithecus*, Geoff. Cuv.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5} = 32$. Facial angle 45° ; head round; nose flat; ears moderate; limbs very long; thumbs of the anterior hands very short and remote; cheek-pouches, and callosities on the buttocks; tail very long and slender.

S. maurus, (*Simia maura*, Lin.) The Negro Monkey, Penn. Fur black; a white spot beneath, near the origin of the tail; about fifteen inches in height. Inhabits the Island of Java.—*Edwards' Glean. pl. 311.*

S. melalophus, F. Cuv. (*Simia melalophus*, Raffles.) The Simpai. Fur of a bright yellowish red above, whitish beneath; a band of black hairs on the forehead; face blue. Inhabits the island of Sumatra.—*F. Cuv.*

S. pruinus, Desm. (*Simia villosa*, Griffith.) Fur blackish, tinged with white; tail brown. Inhabits Sumatra.—*Mam. 533.*

This animal differs from the *S. maurus* in the want of a white spot at the insertion of the tail.

S. comatus, Desm. Fur above gray, beneath dirty white; upper part of the head covered with black hair, forming a tuft at the back. Inhabits Sumatra.—*Mam. 533.*

S. entellus, Geoff. (*Simia entellus*, Schreb.) Fur yellowish white; the face and hands black. About three feet and a half in length. Inhabits India.—*Audeb. iv, § 2, pl. 2.*

Gen. 6. CERCOPITHECUS, Cuv. Geoff.—*Simia*, Lin.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5} = 32$. Canines a little projecting, with intermediate spaces for their reception; posterior molars with only four tubercles; head rounded; facial angle 45° to 50° ; ears sometimes rounded, sometimes slightly angular; thumbs distinct, more or less approaching to the fingers; cheek-pouches; callosities on the buttocks, with the exception of one species; tail as long at least as the body, often turned up on the back.

Inhabits Africa, the southern parts of India, and some islands of the Archipelago, living in troops in the forests, but occasionally approaching the cultivated fields. This genus is divided into four sub-genera.

Sub-Gen. 1.—*LASIOPYGA*, Illig.—*Hands longer than the fore-arms ; anterior thumbs very short and slender ; no callosities ; buttocks bordered with long hair.*

C. nameus, Desm. (*Simia namea*, Lin.) Cochinchina Monkey, Penn. Fur variegated with brilliant colours. About two feet high. Inhabits Cochinchina and Madagascar.—*Shaw* i. pl. 23.

Sub-Gen. 2.—*NASALIS*, Geoff.—*Nose projecting and disproportionately long ; ears little and round ; body thick ; anterior hands with four long fingers and a short thumb ; posterior broader, with thick nails ; tail longer than the body ; callosities.*

C. nasicus, Desm. (*Simia nasica*, Schreb.) Proboscis Monkey, Penn. Fur reddish fawn-coloured ; nose very long ; face black.

Inhabits the island of Borneo, lives in troops on trees in the vicinity of rivers, and is savage in its manners.—*Shaw*, i. pl. 22.

Sub-Gen. 3.—*CERCOPITHECUS*, Lin. Cuv. Geoff.—*Head round ; forehead tapering behind ; facial angle 50° ; no superciliary ridges ; nose flat and open, at the top of the nasal furrows ; callosities on the buttocks ; tail much longer than the body ; orbitary hollows with smooth borders.*

C. auratus, Geoff. Fur of a golden yellow ; long hair upon the forehead and cheeks ; a black spot on the knee. Inhabits the Moluccas.

C. talapoin, (*Simia talapoin*, Lin.) Talapoin Monkey, Penn. Fur olive-coloured above ; of a pale yellowish below ; tail ash-coloured beneath ; feet black.—Inhabits Africa.

C. latibarbus, Desm. (*Simia dentata*, Shaw.) The Broad-bearded Monkey. A large beard extended laterally ; end of the tail tufted ; face violet purple. About nine inches in height.—*Shaw*, i. pl. 13.

C. cephus, Geoff. (*Simia cephus*, Lin.) Mustache Monkey. Fur greenish-brown ; last half of the tail of a bright red ; nose and lips blue.—About a foot high.

C. pileatus, (*Simia pileata*, Shaw.) Bonneted Monkey. Of a brown fawn colour above, white below, and long hair on the forehead ; cheeks covered with white short hair ; ears naked, rounded.—About a foot in height.

C. mona, Desm. (*Simia mona*, Lin.) Varied Monkey. Fur chestnut-colour ; outer part of the extremities black ; two whitish spots upon each buttock. About 15 inches high. Inhabits Africa.—*Shaw*, i. pl. 18.

C. nictitans, Desm. (*Simia nictitans*, Lin.) White-nosed Monkey. Fur black, dotted with greenish gray ; nose white and gibbous ;

anterior extremities entirely black above. About a foot and a half in height. Inhabits the coast of Guinea.—*Audeb. Fam. iv. § 1, pl. 2.*

C. petaurista, Desm. (*Simia petaurista*, Lin.) Vaulting Monkey. Fur red above, white below; extremities olive-coloured above, grayish below; lower half of the nose white. About 13 inches in height. Inhabits Guinea.—*Schreb. pl. 19.*

C. ruber, Geoff. (*Simia rubra*, Lin.) Red Monkey. Fur red above; ash-coloured below; a narrow black or white band above the eyes. About 18 inches in length. Inhabits Senegal.—*Schreb. pl. 16, B.*

C. Diana, (*Simia faunus*, Lin.) Palatine Monkey. Fur of a bright chestnut-colour; slate gray on the flanks, with an oblique line of the same colour upon the thighs. About a foot and a half long. Inhabits Africa.—*Audeb. Hist. iv. § 2, pl. 6.*

C. albo-cinereus, Desm. Fur gray above, whitish below, with a row of stiff black hairs across the forehead; hands blackish; tail brown.—Inhabits Sumatra.

Sub-Gen. 4.—CERCOCEBUS, Geoff.—Muzzle a little longer than the preceding; facial angle 45° ; margin of the orbit projecting.

C. cynosurus, Desm. (*Simia faunus*, Lin.) The Malbrouck. Fur brownish-olive above, whitish below, with a whitish band above the eyes. About 14 inches long. Inhabits Bengal, &c.—*Audeb. iv. § 2, pl. 5.*

C. sabæus, Desm. (*Simia sabæa*, Lin. The Green Monkey, Penn.) Fur greenish-olive above; dirty white below; head pyramidal; face black; cheeks furnished with long hairs; scrotum of a copper-green colour, surrounded with yellow hairs; end of the tail yellow. About 16 inches long. Inhabits Senegal and the Cape de Verd Islands.—*Audeb. iv. § 2, pl. 4.*

This is one of the species most frequently imported into Europe. In captivity they display a considerable portion of malice and intelligence. Adanson found them in immense numbers in Senegal. Though in large troops upon the trees, he did not at first notice them, until his attention was roused by their flinging branches of trees toward him. They were not at all frightened by the discharge of fire arms, and preserved the most profound silence even when they were wounded. The individual of which M. F. Cuvier gives a figure was remarkably gentle. He was fond of being handled by those whom he knew, and expressed his satisfaction by a gentle grunt.

C. griseo-viridis, Desm. The Grivet. Fur of greenish-gray; scrotum copper-green, with the surrounding hairs white; head pyramidal; tail entirely gray.

C. pygerythreus, F. Cuv. Fur of a greenish-gray colour above; white below; scrotum verdigris green, surrounded with white hairs; hair round the anus deep red; termination of the tail black.—Inhabits the Cape of Good Hope.

C. fuliginosus, Desm. (*Simia Æthiops*, Lin.) The Mangabey. Fur

of a brown slate-gray colour, without spots on the head and neck ; upper eyelids white.

About 21 inches long. Inhabits Ethiopia according to Hasselquist, and Madagascar according to Buffon.—*Shaw*, i. pl. 20.

C. Ethiops, Desm. (*Simia Ethiops*, Lin.) The Collared Mangabey. Fur of a brown wine-colour ; upper eyelids white ; a white band separating the eyes, and proceeding on each side to the top of the neck. About a foot and a half high.—*Audeb.* Fam. iv. § 2. pl. 10.

C. Alys, Geoff. (*Simia Alys*, Aud.) Fur entirely white ; hands, face, and ears flesh-coloured.

This is conjectured by some naturalists to be only an accidental variety of some other species, like the Albinos among the negroes. About 17 inches in length. Country unknown.

Gen. 7. *MACACUS*, Lacep. *Pithecus*, Geoff. Cuv. *Simia*, Lin. &c.

Incisors $\frac{1}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5} = 32$. Canine teeth very strong, above all in the males ; the first and second molars have two tubercles on their crown ; the three others have four, with the exception of the last of the lower jaw, which has five, and which is terminated by a heel ; facial angle 40° to 45° ; superciliary ridges much developed ; muzzle broad and projecting ; eyes approaching ; nostrils oblique ; ears naked, close to the head, angular ; cheek-pouches ; lips thin and extensible ; callosities on the buttocks.

Inhabits Africa and India, living in troops, and often doing great damage to the gardens and cultivated fields.

Sub-Gen. 1.—*MACACUS*, properly so called.—Tail more or less long.

M. silenus, Desm. (*Simia silenus et leonina*, Gm.) The Ounderou. Fur black ; a mane and large gray beard ; tail of medium length, terminated by a tuft of hair.—About two feet high. Inhabits Ceylon.—*Shaw*, i. pl. 16.

M. Sinicus, Desm. (*Simia Sinicus*, Lin.) Fur chestnut-brown ; hair of the head diverging from the centre to the circumference, and disposed in the form of a cap. Inhabits Bengal, East Indies.—*Shaw*, i. pl. 20.

M. radiatus, Desm. Fur greenish-brown above ; clear ash-coloured below ; hair on the top of the head diverging, and dispersed in the form of a cap. Inhabits India.—*Ann. de Mus.* xix. p. 98.

M. cynomolgus, Desm. (*Simia cynomolgus*, Lin.) Hare-lipped Monkey. Fur greenish brown or olive above, grayish white below ; edges of the orbits projecting in the male ; a tuft of hair in the middle of the forehead in the female. One foot eight inches long. Inhabits Africa.—*Shaw*, i. pl. 16.

M. rhesus, Desm. Pig-tailed Baboon. Upper part of the body of a greenish gray ; tail short and wrinkled at its base ; buttocks

of a golden yellow ; extremities grayish. About a foot long. Inhabits forests on the banks of the Ganges.—*Shaw*, i. pl. 25.

M. nemestrinus, (*Simia nemestrina*, Lin.) Brown Baboon. Colour deep brown above, middle of the head and dorsal band black ; tail short and slender, only reaching to the middle of the thigh ; head and extremities yellowish. Larger than the last. Inhabits Java and Sumatra.—*Shaw*, i. pl. 13.

Sub.-Gen. 2. MAGOT.—*Tail replaced by a simple tubercle.*

M. inuus, (*Simia inuus*, *S. silvanus*, Lin. the young.) The Pigmy Ape. Fur of a greenish gray ; a cutaneous appendage in place of a tail. Inhabits Barbary, Egypt, and the rocks in the neighbourhood of Gibraltar.—*Shaw*, i. pl. 7, 8.

Gen. 8. CYNOCEPHALUS, Cuv.—*Simia*, Lin. &c.—*Papio*, Bris. &c.

Incisors $\frac{1}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 32. Canine teeth very strong ; left molar of the under jaw on each side with a heel ; head and muzzle much elongated ; nostrils placed at the extremity, like the dog ; facial angle 30° 35° ; superciliary, sagittal, and occipital ridges much developed ; orbit hollow ; maxillary bone much produced ; face wrinkled with longitudinal striæ ; ears flat and angular ; cheek-pouches ; members of nearly equal length, and very robust ; large callosities.

The Cynocephala arrive at considerable magnitude, and their proportions indicate vigour and agility. Ferocity, though not unmingled with intelligence, is a marked trait in their character. They are in confinement observed to pass in a few moments, and without any apparent cause, from affection to menace, from indifference to rage, and some of them have been known to expire from the consequences of their fury. Their cunning and promptitude in laying waste a plantation are so great, that the utmost vigilance is scarcely sufficient to prevent their devastations. When they eat, they commence by filling their cheek-pouches, and they drink by suction. They are comparatively docile when young, and may be taught little exercises and tricks ; but in maturity they refuse obedience, and resume their natural ferocity.

Sub.-Gen. 1. BABOONS.—*Tail longer or nearly as long as the body.*

C. babouin, Desm. (*Simia cynocephalus*, Lin.) Little Baboon. Fur of a yellowish green ; face the colour of raw flesh ; cartilage of the nostrils not passing the bone of the upper jaw. Upwards of two feet long. Probably the Cynocephalus of the ancients.—Inhabits Southern Africa.

C. papio, Desm. Guinea Baboon. Fur of a yellowish brown ; face entirely black ; cartilage of the nostrils surpassing the jaws at their superior extremity ; upper eyelids white. Inhabits the Coast of Guinea.—*Audeb.* iii. § 1, fig i.

C. porcarius, Desm. (*Simia porcaria*, Lin.) Pig-faced Baboon. Fur of a blackish green above ; a mane of long hair on the neck ; face of a blackish violet ; upper eyelids white. Female without a mane.—Inhabits the Cape of Good Hope.

C. hamadryas, Desm. (*Simia hamadryas*, Lin.) Dog-faced Baboon. Fur ash-coloured; mane and beard very long; face flesh-coloured; hands black. Inhabits the environs of Moca on the Persian Gulf.—*Shaw*, i. pl. 15.

Sub.-Gen. 2. MANDRILLS.—*With a very short and slender tail perpendicular to the dorsal spine.*

C. mormon, Desm. (*Simia maimon*, Lin.) The Mandril or Variegated Baboon. Fur grayish brown or olive above, white below; beard yellow; face blue in the adult; nose red in the male.

This is among the largest of apes, since it attains sometimes the height of five feet when on its hind legs. Young males and females have the muzzle shorter, and of a uniform blue. The nose of the males does not become red till their canine teeth are fully developed, when the wrinkles of their face begin to appear. From the Gold Coast and Guinea in Africa.—*Shaw*, i. pl. 10.

C. leucophæus, Desm. (*Simia leucophæa*, Fred. Cuv.) Fur grayish brown, greenish above, white below; face of both sexes at all ages of a deep uniform black. About three feet in length.

The three following species, viz. The wood Baboon, Penn. *Simia sylvicola*, Shaw; the yellow Baboon, Penn. *S. sublutea*, Shaw; and the Cinereous Baboon, Penn. *S. cinerea*, Shaw; together with the *S. apedia* of Linnaeus, seem in M. Desmarest's opinion to have great affinity with the preceding, and perhaps to have been established from ill-preserved species.

C. Niger, Desm. Fur black; hair woolly, except that on the top of the head, which is lank, and forms a tuft on the occiput; no tail?—From the Indian Archipelago.

2d TRIBE.—APES OF THE NEW CONTINENT.

(*Simiæ Platyrrhini*, Geoff.)

Six molars on each side of both jaws, with blunt tubercles, or five only with sharp tubercles. Partition of the nostrils broad; nostrils opening on the sides of the nose; tail always long, often prehensile; buttocks hairy, never with callosities; no cheek-pouches; head generally rounded.

They live in troops as the other apes, feeding on fruits, roots, and sometimes insects: but are less turbulent and lascivious than those of the Old Continent. They inhabit South America from Mexico to Paraguay, particularly the wooded and well-watered districts situated to the east of the chain of the Andes, Guiana, Brazil, Para, a part of Peru, &c.

1st Division. SAPAJOUS.—*Tail long and prehensile.*

Gen. 9. ATELES, Geoff. Cuv.—*Simia*, Lin.

Incisors 1, canines 1-1, molars $\frac{6}{6}$ - $\frac{6}{6}$, = 36. Canines little projecting, crossing one another, conical; molars with blunt crowns as those of man; head round; face perpendicular; facial angle about 60°; ears bordered. Extremities very long and slender; the anterior ones generally tetradactyle; thumb none, or only replaced by a wart, or extremely short, and armed with a little sharp nail; posterior pentadactyle; nail con-

vex and short; tail extremely long, strongly prehensile, having a part without hair, and covered with a delicate skin towards its extremity.

These apes are slow in their movements, and live in monogamy, bringing forth only one young at a time.

* *With a very little nailed thumb on the hands, or a rudimentary thumb without a nail.*

A. hypoxanthus, Kuhl, Desm. Fur yellowish gray; face flesh-coloured, spotted with gray; base of the tail and anal region sometimes of a ferruginous yellow; a little strong and short thumb with a nail on the hands. About two feet long, and the tail nearly the length of the body.—Inhabits Brazil.

A. subpentadactylus, Geoff. Fur entirely black; a very little thumb without a nail on the anterior hands. About a foot and a half long; tail much longer than the body.—Inhabits Guiana.

** *No trace of thumb on the anterior hands.*

A. paniscus, Geoff. (*Simia panisca*, Lin.) The Coaita. Fur entirely black; no thumb on the anterior hands. Inhabits Guiana, Brazil, &c.—*Shaw*, i. pl. 28.

Var. A. Orbit projecting above; partition of the nostrils narrow; all the head naked except a few hairs on the middle of the forehead.—From Surinam.

Var. B. Orbitary partition little projecting; nostrils widely separated, face black, head furnished with hair.—Cayenne.

In this species the prehensile tail is nearly a foot longer than the body of the animal, and nearly answers all the purposes of a hand. The prehensile part of the tail is naked, and has a covering of very delicate skin. In all its movements the animal entwines this tail round the objects near it, draws things towards him too remote to be reached by his hands, and suspends himself by the same organ from the branches of trees.

A. belzebuth, Geoff. The Marimonda. Fur black; belly of a dirty white or yellow in the males, white in the young and females. About 16 inches in length. Inhabits the banks of the Orinoco, living in troops.—*Ann. Mus.* vii. pl. 16.

A. marginatus, Geoff. The Chuva. Fur black; a white ruff around the face. About 16 inches in length. In the adult male the ruff of hair yellowish; white in the females. Common on the banks of the rivers Santiago, and Amazons.—*Ann. Mus.* xvii. pl. 9.

A. arachnoides, Geoff. The Spider Monkey. Fur of a gray fawn-colour, very soft; eyebrows long and black; no thumb on the anterior hands. Inhabits Brazil.—*Ann. Mus.* xiii. pl. 9.

A. melanochir, Desm. Fur gray; top of the head, extremities of the four members, and an oblique spot on each knee of a brown black or gray colour. About 13 inches long.

Gen. 10. LAGOTHEIX, Geoff. Humb.

Incisors $\frac{4}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$, = 36. Head rounded;

ears very small ; facial angle about 50° ; muzzle projecting ; extremities proportioned to the body ; all the hands with five fingers provided with nails ; tail long, strongly prehensile, naked and callous below near its extremity ; hyoid bone little apparent externally ; hair soft and woolly.

- L. Humboldtii*, Geoff. (The Capparo.) Fur of a blackish ash-colour ; hair long. Body upwards of two feet long ; tail a little longer than the body.

Of a gentle nature, frequently standing upon its hind feet.—Inhabits the banks of the Rio Guaviara, South America.

- L. canus*, Geoff. Silver-haired Monkey. Fur olive gray ; head, hands, and tail of a red gray ; hair short.—Inhabits Brazil.

Gen. 11. MYCETES, Illiger.—*Stentor*, Geoff.—*Aluata*, Lacep.—*Cebus*, Erxleb.—*Simia*, Lin. Schreb. &c.

Incisors $\frac{1}{4}$, canines $\frac{1}{4}$ — $\frac{1}{4}$, molars $\frac{6}{8}$ — $\frac{6}{8}$, = 36. Canines well developed, triquetrous ; head pyramidal ; countenance oblique ; facial angle 30° . Hyoid bone ventricose, apparent externally and cavernous. Four extremities pentadactyle ; tail very long, strongly prehensile, naked under its extremity ; nails convex and short.

Savage apes, living in numerous troops, and making the forests resound with their cries particularly at the rising and setting of the sun. They use their tail as an instrument of prehension.—Found from Paraguay to Guiana.

- M. seniculus*, Desm. (*Simia seniculus*, Lin.) Red Howling Monkey. Upper part of the body of a fine red ; head, extremities, and tail of a deep lively red ; face naked and black. Body upwards of two feet long ; tail nearly as long as the body. Inhabits French Guiana, &c.—*Audeb.* v. fig. 1.

- M. ursinus*, Desm. The Araguato, Humb. Fur of a uniform golden red ; face in part covered with hairs. Form and size of the preceding. Inhabits South America.—*Humb. Obs. Zool.* fig. 30.

- M. stramineus*, Desm. The Arabata. Fur of a straw yellow, the hairs being of this colour at their point, and brown at their base. A little less than the preceding.—Inhabits South America.

- M. fuscus*, Desm. (*Simia belzebuth*, Lin.) The Guariba. Fur chesnut brown back and head, inclining to chesnut ; the extremities of the hairs golden colour. A little larger than the *seniculus*. A solitary and savage species, inhabiting the most retired deserts. Brazil.—*Buff. Suppl.* vii. t. 26.

- M. flavicaudatus*, Desm. The Choro. Fur blackish brown, of a darker tint on the back ; tail ornamented on both sides with two yellow stripes.

A little smaller than the *M. seniculus*. Lives in troops, and is hunted for its skin, which is employed to cover the saddles of the mules on which they travel on the Cordilleras. Inhabits the province of Jaen in New Grenada, and the banks of the river Amazons.

M. niger, Desm. Araay of Azara. Fur of a very fine black in the male ; sides and under part of the body fawn-coloured in the female and young. About one foot nine inches long ; tail the length of the body.

Lives in forests, feeding on leaves and fruits, and making itself be heard at break of day by a strong rough voice, which has been compared to the sound of a number of carriages not greased.—Inhabits Paraguay, Bahia, and the interior of Brazil.

M. rufimanus, Desm. The Red-handed Howler. Fur black ; hands red ; tail the length of the body.

Gen. 12. CEBUS, Erxleb.—*Callithrix*, Geoff. Cuv. Illig.—*Simia*, Lin. &c.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$, = 36. Superior incisors larger than the inferior ; canines more or less strong, those of the males being much more so than the females ; head round ; muzzle short ; forehead a little prominent ; occiput projecting behind ; facial angle about 60° ; ears rounded ; hyoid bone not projecting ; tail prehensile, but entirely covered with hair.

Lives in society in forests, but never quits the trees, feeding on fruits and insects. Inhabits South America from the Guianas to Paraguay. M. Desmarest remarks of this genus that the species are difficult to be characterized. The exterior form is nearly the same in all, and preceding authors vary much in the number of those which they admit into their methods. Brisson describes three ; Linnæus four ; Gmelin six ; Buffon two ; and Baron Cuvier reduces them to one. In these circumstances, M. Desmarest thinks it safer to consider as distinct species all those which have been regarded as such by authors, with the exception of two of Gmelin's. From the researches of Dr Kuhl in the museums of Germany, Holland, and Paris, he is led to think that if all are not separate species they form at least very constant varieties.

C. robustus, Desm. Fur brown ; a black line above the head and neck and surrounding the face ; arms of a bright yellow ; fore part of the neck and belly of a reddish chestnut in the male, and of a brown pale yellow in the female and young. About 20 inches in length.—Common in Brazil.

C. apella, Desm. (*Simia apella*, Lin.) The Weeper. Fur of a pretty deep brown above, fainter below ; top of the head, tail, and feet of a blackish-brown ; face brown, surrounded with hairs of a blackish brown colour ; external side of the arms and under side of the neck of a yellowish brown. About 18 inches in length. Found in French Guiana.—*Schreb.* t. 28.

C. griseus, Desm. (*Cebus barbatus*, Geoff.) The Gray Sajou. Fur of a brown fawn-colour, mixed with grayish above ; of a clear fawn-colour below ; head capped with black ; no beard ; arms the colour of the back ; face surrounded with hair of a blackish brown ; sometimes white under the neck and breast. Size of the preceding. Country unknown.—*Buff.* xv. t. 5.

C. barbatus, Desm. (*Cebus albus*, Geoff.) The bearded Sapajou. Fur grayish red, varying to gray and white, according to the age and sex ; belly red ; beard prolonged on the cheeks ; hair long and soft. Size of the preceding.—*Ann. Mus.* xix. fig. 12.

Var. A. Fur white, with the summit of the head and the hind legs of a pale reddish gray.

Var B. Fur fine, undulated hair of a dirty yellowish uniform white, and colour a little deeper in the feet and tail.—Inhabits Guiana.

C. frontatus, Desm. Kuhl. (*Simia trepida*, Lin.) The Fearful Monkey. Of an almost uniform black brown colour, with the top of the head and the extremities of the members of a deeper shade; hair of the forehead raised perpendicularly, very erect; scattered white hairs around the mouth and on the anterior hands. About 15 inches long.—Country unknown.

C. niger, Desm. Geoff. The black Sapajou. Fur deep brown; face, hands, and tail black; forehead and posterior part of the cheeks covered with yellowish hair.

M. Humboldt unites this species with that of the brown Sapajou. Country unknown.—*Buff. Suppl.* vii. t. 28.

C. variegatus, Desm. Geoff. The Variegated Sapajou. Fur blackish, spotted with golden yellow, belly reddish; hair of the back of three colours, the roots brown, then red, and the apex black; head round; snout projecting; interocular region of a blackish brown. About 15 inches in length.—Country unknown.

C. fulvus, Desm. (*Cebus flavus*, Geoff. *Simia flava*, Schreb.) The Yellow Sapajou. Fur entirely fawn-coloured; hair silky and erect, not waved. Inhabits Brazil.—*Schreb.* t. 31, B.

C. albifrons, Desm. Geoff. White-fronted Sapajou. Fur gray, brighter on the belly; summit of the head black; forehead and orbits white; extremities of a yellowish brown. About 14 inches long.—Inhabits the banks of the Orinoco.

C. lunatus, Desm. Kuhl. The Spectacle Sapajou. A cross white band upon each cheek, reaching from the eyebrows to the mouth. About the size of the *apella*.

C. xanthosternos, Desm. Kuhl. The yellow-breasted Sapajou. Fur chestnut-coloured; under the neck and breast of a clear reddish yellow.—Inhabits Brazil.

C. fatuellus, Desm. (*Simia fatuellus*, Lin.) The Horned Sapajou. Fur on the back chestnut coloured; bright red under the belly; extremities and tail of a brown black; two strong tufts of hair rising from the forehead. About 14 inches long. Inhabits Guiana.—*Shaw*, i. pl. 28.

C. cirrifer, Geoff. Desm. The Crowned Sapajou. Fur chestnut brown; vertex, extremities, and tail of a chestnut colour, verging to black; a tuft of elevated hair of a horse shoe form on the top of the head; head round. About 16 inches long.—Inhabits Brazil.

C. capucinus, Desm. (*Simia capucina*, Lin.) Capuchin Monkey. Fur varying from brown gray to olive gray; crown of the head and extremities black; forehead, cheeks, and shoulders of a whit-

ish gray. Upwards of a foot long ; tail longer than the body. Inhabits Guiana.—*Buff.* xv. t. 8.

- C. hypoleucus*, Desm. (*Simia hypoleuca*, Humb.) The white-throated Sapajou. Fur black ; forehead, sides of the head, throat, and shoulders white. About a foot long ; tail longer than the body. Inhabits Guiana.—*Buff.* xv. t. 9.

2d DIVISION. SAGOINS.—*Tail long, not prehensile.*

Gen. 13. CALLITHRIX, Cuv. Geoff.—*Simia*, Lin.—*Cebus*, Erxl.—*Saguinus*, Lacep.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$, = 36. Canines of medium size ; inferior incisors vertical and contiguous to the canines ; head small, rounded ; muzzle short ; facial angle 60° ; partition of the nostrils not so broad as the row of the upper incisors ; ears very large and deformed ; tail a little longer than the body, not prehensile, and covered with short hair ; body rather slender.

- C. sciureus*, Desm. (*Simia sciurea*, Lin.) The Squirrel Monkey. Fur olive gray ; muzzle blackish ; arms and legs of a bright red. Nearly a foot long. Inhabits Brazil, Cayenne, &c.—*Shaw*, i. pl. 25.

Var. A. Back of one colour.

Var. B. Variegated with bright red and black, and larger in size.

- C. personatus*, Desm. Geoff. The Masked Monkey. Fur gray fawn-coloured ; head and fore hands blackish ; tail red.—Inhabits Brazil.

- C. lugens*, Desm. Geoff. (*Simia lugens*, Humb.) Fur blackish ; throat and anterior hands white ; tail scarcely longer than the body. About a foot long.—South America.

- C. amictus*, Desm. Geoff. (*Simia amicta*, Humb.) The Ruffed Sagoi. Fur blackish brown ; a half collar of white ; hands of the anterior extremities of a pale yellow ; tail longer by a fourth than the body. Almost double the size of the *sciureus*.—Inhabits South America.

- C. torquatus*, Desm. Geoff. The Collared Monkey. Fur chestnut brown, yellow below ; a half collar of white ; tail a little longer than the body.—Inhabits Brazil.

- C. moloch*, Desm. Geoff. Fur ash-coloured, with annulated hairs above ; temples, cheeks, and belly of lively red ; end of the tail and hands of a clear gray, almost white ; tail almost a half longer than the body. Size almost double that of the *sciureus*. Inhabits Peru.

- C. melanochir*, Desm. Kuhl. The Black-handed Sagoi. Fur ash-coloured ; posterior part of the back and extremity of the tail of a reddish brown ; anterior hands fuliginous.—Inhabits Brazil.

- C. infulatus*, Desm, (*Callithrix infulata*, Kuhl.) Mitred Sagoi.

Fur gray above ; reddish yellow below ; with a large white spot surrounded with black above the eyes ; origin of the tail of a reddish yellow colour, its extremity black.—Inhabits Brazil.

Gen. 14. *AOTUS*, Humb. Geoff. Illig.

Dental formula same as last genus ; head round and very large ; muzzle short ; eyes very large and approaching ; nostrils separated by a very thin partition ; ears small ; tail as long as the body, not prehensile, and covered with hair ; hands pentadactyle, nails flat.

A. trivirgatus, Geoff. Humb. The Douroucoulí. Fur ash-coloured ; belly of a reddish yellow ; with three brown and parallel lines extending from the forehead to the occiput. About nine inches long ; tail longer than the body.—*Griff. Quad. t. 14.*

Inhabits thick forests near Maypura and Esmeralda in South America. It lives solitary upon trees, passes the day in sleeping, and seeks its food during the night. It feeds on insects, which it catches with much address, little birds, and fruits. It is monogamous.

Gen. 15. *PITHECIA*, Desm. Cuv. Geoff.—*Simia*, Lin.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$, = 36. Incisors approaching, the upper ones oblique and the broadest ; canines strong, triquetrous ; partition of the nostrils broader than the row of the upper incisors ; head round, muzzle short ; facial angle about 60° ; ears rounded ; tail a little longer than the body, not prehensile, and furnished with long hair ; feet pentadactyle ; nails short and armed.

These are nocturnal animals living upon trees, which they seldom quit, and which furnish them with fruits and insects, their habitual food. Inhabit Brazil, the Guianas, and Paraguay.

P. Satanas, Geoff. Desm. (*Cebus Satanas*, Hoffm.) The Couxió. Fur of a brown black in the male ; of a reddish brown in the female ; thick locks covering all the head and falling upon the forehead ; a well furnished beard ; tail nearly the length of the body. About 16 inches long.—Inhabits the banks of the Orinoco.—*Humb. Obs. t. 27.*

P. chiropotes, Desm. Geoff. Fur reddish chestnut ; hair of the head thick, separated in the middle, and rising in two distinct tufts on each side of the head ; a long and bushy beard. Size of the preceding.—Inhabits the deserts of the Upper Orinoco. Habit solitary. It drinks in the hollow of its hand, from whence the specific name *chiropotes* given by *Humboldt*.

P. rufiventer, Desm. (*Simia pithecia*, Lin.) Fox Tailed Monkey. Fur reddish brown ; belly red ; the hair brown at its origin, and annulated towards the end with red and brown : locks radiating from the vertex, and falling upon the forehead ; no beard ; tail nearly the length of the body. Size of the preceding. Inhabits French Guiana.—*Shaw, i. t. 25.*

- P. miriquoia*, Geoff. Desm. (*Miriquoia* Azara.) Fur gray brown above; cinnamon-coloured below; hair of the back annulated, first with white, with black in the middle, and white at the point; two white spots above the eyes; no beard; tail a little longer than the body. Body about 14 inches in length.—Inhabits S. America.
- P. rufibarba*, Desm. Kuhl. The red-headed Saki. Body of a brown black above; below of a pale red; pale red above the eyes; tail pointed at the end.—Inhabits Surinam.
- P. ochrocephala*, Desm. Kuhl. Yellow-headed Saki. Fur of a clear chestnut colour above; red ash-coloured yellowish below; hands and feet of a brown black; hair of the forehead and around the face of an ochre yellow. About ten inches long.—Inhabits Cayenne.
- P. monachus*, Desm. Geoff. The Monk. Fur variegated with large spots of brown and dirty yellowish white; hair chiefly brown at its origin, and red and golden towards its extremity; hair of the head radiating from the occiput and ending at the vertex; tail nearly the length of the body; no beard. A little smaller than *P. rufiventer*. Inhabits Brazil.—*Buff. Supp.* vii. t. 30.
- P. leucocephala*, Desm. Geoff. (*Simia pithecia*, Lin.) The Yärke. Fur black, around the head of a dirty white; each hair of one colour; tail nearly the length of the body; no beard. Body about ten inches long. Inhabits Guiana; rare.—*Audeb.* vi. §. i. f. 2.
- P. melanocephala*, Desm. (*Simia melanocephala*, Humb.) The Cacajao. Fur yellowish brown; head black; no beard; tail a sixth shorter than the body. Body about a foot and a half long. Inhabits the banks of the rivers Cassiquiana and Rio Negro in S. America.—*Humb. Obs. Zool.* t. 29.

Gen. 16. JACCHUS, Des. Geoff.—*Saguinus*, Cuv.—*Simia*, Lin.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$, = 36. Incisors and canines variable in their dimensions; molars with a crown furnished with sharp tubercles; head round; muzzle short; occiput prominent; tail longer than the body, soft, and entirely covered with hair; feet pentadactyle; thumb of the anterior hands not opposable; nails very long, compressed, arched and pointed.

These animals, always of small size (nearly that of a squirrel,) are of a gentle nature, and their habits are similar to those of the other American apes. They are easily tamed. Inhabit chiefly Brazil and the Guianas.

Sub-Gen. 1. OUISTITI, *Jacchus*, Geoff.—*Intermediate incisors of the upper jaw broader than the lateral ones; these last isolated on each side; lower incisors elongated, narrow, vertical, the lateral ones longest, upper canines conical, and of medium length, the two inferior ones very small.*

• *With annulated tail.*

J. vulgaris, Desm. Geoff. (*Simia Jacchus*, Lin.) Striated Monkey.

Fur ash-coloured; croup and tail annulated with gray brown and ash-colour; a white spot on the forehead; very long ash-coloured hair before and behind the ears; remainder of the head and shoulders brown red. Body six inches long.—*Shaw*, i. pl. 25.

Var. A. Fur red; croup annulated with red and ash-colour.—Inhabits Brazil.

J. penicillatus, Geoff. Desm. The tufted Jacchus. Fur ash-coloured; croup and tail annulated with brown and ash-colour; a white spot on the forehead; a tuft of long black hairs before the ears; head and top of the neck black. About the size of the preceding; but the head smaller and more rounded.—Inhabits Brazil.

J. leucocephalus, Geoff. Desm. The white-headed Jacchus. Fur red; head and chest white; upper part of the neck black; tail annulated with brown and ash-colour; very long hair before and behind the ears. Size of the two preceding.—Inhabits Brazil.

J. auritus, Geoff. Desm. The great-eared Jacchus. Fur black mixed with brown; tail annulated with blackish and ash-colour; a white spot on the forehead; a tuft of very long white hairs covering the interior of the ears. Size of the preceding.

J. humeralifer, Geoff. Desm. The white-shouldered Jacchus. Fur chestnut brown; tail slightly annulated with ash-colour; shoulders, breast, and arms white.—Inhabits Brazil.

Some naturalists regard the five last named as only varieties.

**** With tail not annulated.**

J. melanurus, Geoff. Desm. The black-tailed Jacchus. Fur brown above, fawn-coloured below; tail of a uniform black, and a fourth longer than the body.—Inhabits Brazil.

J. argentatus, Geoff. Desm. (*Simia argentata*, Lin.) The fair monkey. Fur white; face, feet, and hands red; tail black or white, but almost double the length of the body.—Inhabits Para in South America.—*Shaw*, i. pl. 26.

Sub.-Gen. 2. TAMARIN. *Midas*, Geoff.—Four upper incisors contiguous, the intermediate being broader than the lateral ones; four lower incisors inclined, contiguous; canines conical, pretty strong, and inclining outwards; ears large; forehead rendered very apparent by the projection of the orbital ridge.

J. rufimanus, Desm. (*Simia Midas*, Lin.) Fur black; croup variegated with gray; hands and feet of a red colour; body seven or eight inches long. Inhabits Guiana, &c.—*Shaw*, i. pl. 26.

J. ursulus, Desm. (*Midas ursulus*, Geoff.) Fur black; back undulated with bright red; hands black. Size of the preceding. Inhabits Para in South America.—*Audeb.* vi. § 2, fig. 6.

J. labiatus, Desm. (*Midas labiatus*, Geoff.) Fur blackish; ferruginous red below; head black; nose and margins of the lips white.—Inhabits Brazil.

J. chrysomelas, Desm. Kuhl. Fur black; forehead and upper side

of the tail of a golden yellow ; fore-arms, knees, breast, and sides of the head of a red chestnut.—Inhabits forests in Brazil.

J. albifrons. Fur black, slightly variegated with white ; face black ; tail a little longer than the body.—*Act. Stockholm*. 1819.

J. rosalia, Desm. (*Midas rosalia*, Geoff. *Simia rosalia*, Lin.) Fur golden red ; a long mane. About nine inches long. Inhabits Guiana and Brazil.—*Shaw*, i. pl. 25.

Var. A. Fur varied with red and blackish. Guiana.

Var. B. Fur of a bright red ; tail of the same colour. Brazil.

J. leoninus, Desm. (*Simia leonina*, Lin.) Fur brown olive ; a long mane of the same colour ; face black ; mouth white ; tail blackish above, brown below ; body seven or eight inches long ; tail about the length of the body.—*Humb. Zool. Obs.* t. 5.

A very lively animal, very irascible, and emitting a whistling sound like birds. Inhabits the warmer regions of South America.

J. Œdipus, Desm. (*Simia Œdipus*, Lin.) Fur of a brown fawn-colour above, white below, with locks of long bristly white hair ; tail red in its first part, and black in the other ; about nine inches long ; tail nearly double the length of the body.—Inhabits South America.—*Buff.* xv. t. 17.

FAMILY II.—LEMURES.

General form approaching to the quadrupeds, properly so called ; incisors varying in both jaws in number, form, and situation ; nostrils at the extremity of the muzzle ; posterior extremities longer than the anterior ; first finger of the hind feet after the thumb terminated by a sharp turned up nail ; two or four pectoral mammæ ; tail, when it exists, not prehensile.

The Lemurs may be considered as the link between the Quadrumana and the genuine quadrupeds. These animals being for the most part nocturnal, Linnaeus, in reference to the Roman mythology, called them Lemurs or ghosts.

Gen. 17. INDRIS, Lacep. Cuv. Geoff. Desm.—*Lemur*, Gmel.
—*Lichanotus*, Illig.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 32. Superior incisors united by pairs ; the external inferior ones broadest ; molars with a tuberculous crown ; two pectoral mammæ ; head long, triangular ; posterior members pretty long ; the second toe of the hind feet subulate ; tail sometimes very short, sometimes very long ; fur woolly.

I. brevicaudatus, Desm. Geoff. (*Lemur indri*, Lin.) Fur blackish ; tail very short. About three feet long.—*Shaw*, i. pl. 32.

Its voice resembles that of a child crying. It is trained to hunting by the natives of the south part of Madagascar.

I. longicaudatus, Geoff. Desm. (*Lemur laniger*, Gm.) Fur fawn-

coloured ; tail very long. About a foot long. Inhabits Madagascar.—*Shaw*, i. pl. 34.

Gen. 18. LEMUR, Lin. Cuv. Geoff. Desm.—*Prosimia*, Bris.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{1}$ — $\frac{5}{1}$, = 32. Superior incisors united in pairs, inferior inclined, long ; superior canines long, compressed, crossing the inferior ones before ; inferior canines, or first molars compressed, triangular ; molars with blunt tuberculous crown ; two pectoral mammæ ; head long and triangular ; muzzle slender ; ears short, rounded ; the fourth toe of the feet largest ; tail longer than the body, covered with hair, not prehensile ; hair soft and woolly.

They live in troops more or less numerous, like the apes, upon trees, and climb with excessive quickness. Feed on vegetable substances, fruits, and roots.

L. macaco, Lin. Geoff. &c. Ruffed Lemur. Fur variegated with large patches of black and white ; tail all black ; hair of the cheeks very long. About 20 inches long.—*Schreb.* t. 49.

Var. A. Black colour replaced by a brown gray.—Inhabits Madagascar.

L. ruber, Peron, Geoff. Cuv. Black and Red Lemur. Fur of a fine reddish chestnut colour ; head, hands, abdomen, and tail black ; a white spot on the neck. About 16 inches long. Madagascar.—*Griff. Quad.* t. 33.

L. catta, Lin. Ring-tailed Lemur. Fur reddish ash-coloured above, ash-coloured on the limbs, white below ; tail annulated with black. About a foot long. Madagascar.—*Shaw*, i. pl. 35.

L. niger, Geoff. Desm. Black Lemur. Fur entirely black ; long hair on the neck. Size of the domestic cat. Inhabits Madagascar.—*Edw. Glean.* iii. pl. 217.

L. mongoz, Lin. Geoff. Desm. The Mongooz. Fur yellowish gray above, white below ; around the eyes and forehead black. About 17 inches long. Inhabits Madagascar.—*Shaw*, i. pl. 33.

The Mongous pass a considerable portion of the day in sleep, rolled up in a ball, having their large tail passed between their hind-legs, and twined round their neck. Like the other Lemurs they are essentially formed for climbing trees. They will leap ten feet from the ground without any apparent effort. They carry their food to their mouth with the hand, and drink by suction. When tranquil their voice is a feeble grumbling, but insupportably loud when alarmed.

L. fulvus, Desm. Fur brown above, gray below ; forehead elevated and prominent.—Inhabits Madagascar.

L. albinus, Geoff. Desm. White-handed Lemur. Fur gray brown above ; sides of the neck of a red cinnamon colour ; breast white, belly reddish, hands and feet white. Body 14 or 15 inches long.—Inhabits Madagascar.

L. rufus, Desm. Geoff. Red Lemur. Fur of a golden red above, yellowish white below ; all the head white except the face ; a black band extending from the face to the occiput. Size of the preceding.—Inhabits Madagascar.

L. collaris, Desm. Geoff. Collared Lemur. Fur red brown above, fawn-coloured below; a ruff of red hair; face lead-coloured. A little larger than the *L. catta*.—Inhabits Madagascar.

L. albifrons, Geoff. Desm. White-fronted Lemur. Fur of a gray red above, whitish below; forehead of the male white; female with the same part of a deep gray, and a black longitudinal line on the top of the head. Size of the *L. catta*.—Inhabits Madagascar.

L. nigrifrons, Geoff. Desm. Black-fronted Lemur. Fur on the upper part ash-coloured before, and grayish red on the posterior parts; a black band on the forehead; abdomen and under side of the thighs red. Size of the preceding. Inhabits Madagascar.—*Schreb. t. 42.*

L. cinereus, Geoff. Desm. Ash-coloured Lemur. Fur above yellowish gray, beneath dirty white; hair of the tail of a uniform gray. Inhabits Madagascar.—*Buff. Sup. vii. t. 84.*

Gen. 19. **LOUIS**, Geoff. Lacep. Cuv.—*Lemur*, Gmelin.—*Stenops*, Illig.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{5}-\frac{6}{5}$, = 36. Upper incisors very small, separated in their middle; inferior inclined, contiguous, and very small; molars with sharp pointed crowns; head round; muzzle turned up; nose prolonged; eyes very large, separated by a very thin bony partition; ears short and hairy; four pectoral mammæ, from two mammary glands; no tail; bones of the arm and leg distinct; tibia larger than the femur; tarsus and metatarsus of equal length.

L. gracilis, Geoff. Desm. Slender Loris. Fur reddish, with a white spot on the forehead. Body about $7\frac{1}{2}$ inches long.—*Shaw, i. pl. 31.*

A melancholy and patient animal, very slow in its movement, sleeping during the day, and feeding at night on fruits, eggs, insects, &c.—Inhabits Ceylon.

Gen. 20. **NYCTICEBUS**, Geoff.—*Lemur*, Lin.—*Loris*, Cuv.

Incisors $\frac{2 \text{ or } 4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{5}-\frac{6}{5}$ = 34 or 36. Intermediate incisors separate; lateral small or none; anterior molars with one point; those at the bottom with a large crown, hollow in the centre, and tubercles at the angles; body thick; members robust; head round; muzzle short, not turned up; eyes very large, approaching, and directed forwards; ears short and hairy; two pectoral mammæ; a very short tail; bones of the leg and arm distinct; tibia longer than the femur; tarsus and metatarsus of equal length—Inhabits Bengal, Ceylon, and Java.

N. Bengalensis, Geoff. Desm. (*Lemur tardigrada*, Lin.) Slow Lemur. Fur red; a brown dorsal line; four upper incisors; tail

very short. About a foot in length. Inhabits Bengal.—*Shaw*, i. pl. 29.

A nocturnal animal, very slow in its motions, and emitting a monotonous cry.

N. Javanicus, Geoff. Desm. Javanese Loris. Fur red ; with a deeper-coloured dorsal line ; muzzle narrow ; only two upper incisors ; tail short. Size of the preceding.—Inhabits Java.

N. Ceylonicus, Desm. Geoff. (*Cercopithecus Zeylonicus*, Seba.) Ceylon Loris. Fur blackish-brown, entirely black upon the back.—Inhabits Ceylon.

Gen. 21. GALAGO, Geoff. Cuv. Lacep.

Incisors $\frac{4 \text{ or } 2}{6}$, canines $\frac{1}{1}-1$, molars $\frac{6}{3}-\frac{6}{3} = 34$ or 36. Superior incisors separated in the middle, and within the canines ; the inferior ones inclined, the two external being the largest ; molars with sharp points, the first on each side above and below having but one ; two pectoral mammae ; head rounded ; muzzle short ; ears large, membranous, and naked ; eyes very large, approaching ; posterior members very long ; tail long, covered with hair, not prehensile.

The Galagos are nocturnal animals, and have much of the manner of monkeys and squirrels. They are in general gentle, perch constantly on the branches of trees, where they catch insects with their hands and devour them quickly. They make their nests in the branches of the trees, and cover a bed with grass and leaves for their young. With the natives of Senegal they are an article of food.

G. Madagascariensis, Desm. Geoff. (*Lemur murinus*, Penn.) The little Galago. Fur red ; ears a half as long as the head ; tail longer than the body, covered with short hair ; four superior incisors. body about six inches long.—*Brown*, *Illus. Zool.* pl. 44.

G. crassicaudatus, Desm. Geoff. The great Galago. Fur of a gray-red ; ears two-thirds of the length of the head ; tail much tufted ; four upper incisors. About the size of a rabbit.—*Cuv. Regne Anim.* iv. t. 1.

G. Guinensis, Desm. (*Lemur potto*, Lin.) Fur red, ash-coloured when young ; tail of medium length.—Inhabits Guinea.

G. Demidoffii, Geoff. Desm. Fischer. Fur red-brown ; ears not so long as the head ; tail longer than the body, reddish and tufted. Size less than the common rat ; only two upper incisors.—Supposed from Senegal.

G. Senegalensis, Geoff. Desm. Fur gray-red ; ears as long as the head ; tail longer than the body, red and tufted ; two upper incisors. Size of the rat.—Inhabits Senegal.

Gen 22. TARSIIUS, Cuv. Geoff.—*Lemur*, Pallas.—*Didelphis*, Lin.

Incisors $\frac{4}{2}$, canines $\frac{1}{1}-1$, molars $\frac{6}{3}-\frac{6}{3} = 34$. Superior incisors contiguous, unequal ; the intermediate ones large ; the inferior small and crowded by the neighbouring teeth ; canines

less strong than the two intermediate incisors above ; anterior molars with one point, the others with a large crown, deeply hollowed ; head round ; muzzle very short ; eyes excessively large, contiguous ; ears long, naked, and membranous ; tarsus three times longer than the metatarsus ; tail very long.

T. spectrum, Geoff. Desm. (*Lemur spectrum*, Pallas. Woolly Gerboa, Penn.) Fur red ; ears a half shorter than the head ; hind legs larger than the body. Size of the field mouse. Inhabits Amboyna and East India Islands.—*Shaw*, i. pl. 35.

T. fuscomanus, Geoff. Fisch. Yellow Bearded Tarsier. Fur of a clear brown ; gray-white below ; ears two-thirds the length of the head. A little larger than the preceding.—Madagascar.

T. Bancanus, Horsfield. Fur brown ; ears rounded horizontal, much shorter than the head ; tail very slender ; no intermediate incisors in the upper jaw. Inhabits the island of Banca.—*Horsfield*, *Zool. Research.* fasc. ii.

Gen. 23. CHEIROMYS, Cuv. Geoff.—*Lemur*, Shaw.—*Sciurus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{3}-\frac{4}{3} = 18$. Incisors very strong, excessively compressed, corresponding perfectly in both jaws like the incisors of the gnawers ; molars with a flat crown ; foot pentadactyle ; anterior members short ; hands with the thumb short and free, the other fingers very long ; thumb of the posterior hands short, opposable, and furnished with a flat nail ; long bushy tail ; two inguinal mammae ; muzzle short and pointed ; eyes and mouth large.

C. Madagascariensis, Desm. (*Sciurus Madag.* Lin.) The Aye-Aye. Fur brown, thick ; tail black, formed of large hairs, not distichous, as those of the tails of squirrels. About a foot and a half long.

A nocturnal animal, living on insects and worms. Inhabits Madagascar.—*Shaw*, i. pl. 34.

The genus *Cheirogaleus* of M. Geoffroy, established from the drawings of Com-merson, M. Desmarest excludes from his series as not being perfectly ascertained. It includes three species, *major*, *medius*, and *minor*.

ORDER III.—CHEIROPTERA.

GENERAL form disposed for flight. Incisors variable in number ; canines more or less strong ; molars sometimes covered with points, sometimes furrowed longitudinally ; a fold of skin between the four members and the fingers of the anterior

feet; two pectoral mammae; very strong clavicles; scapulae large; fore-arms not capable of rotation.

The distinctive character of this order is the membrane extended between their fore-feet and fingers, which supports them in the air, and permits them to fly when this membrane is sufficiently developed. This arrangement demands powerful clavicles and large shoulder-blades to give the parts the requisite solidity; but it is incompatible with the rotation of the fore-arms, which in this order are fixed. All of these animals have four large canine teeth, but the number of the incisors vary. Their pectoral mamma and male organ of generation connect them with the order Quadrumana, while the other details of their structure equally approach them to the quadrupeds. The early writers seem sufficiently puzzled in what class to arrange this singular group. Aristotle conceived them to be birds with membranous wings; Pliny notices them as viviparous birds; and Aldrovandus made one family of the bat and the ostrich. The Cheiroptera are nocturnal animals, and feed chiefly on insects and fruits. Their power of locomotion on the ground is very limited, and consists in dragging themselves forward in an awkward manner by the thumbs of their wings. They pass a greater part of the year in a state of lethargy, fastened to the roofs of caverns by their hinder feet.

FAMILY I.—GALEOPITHECI.

Fingers of the hands furnished with very crooked nails; dental system anomalous; skin of the flanks covered with hair both above and below.

Gen. 24. GALEOPITHECUS, Geoff. Pall. Desm.—*Lemur*, Gm.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{3}-\frac{6}{3} = 36$. Upper intermediate incisors very small; lateral ones long, compressed, edged, with a little tubercle on each side at their base. Inferior incisors inclined and dentated; posterior molars rough, with points and dentations; muzzle pointed; ears small, rounded; tail of medium length; a membrane enveloping the neck, the extremities, and even the fingers and tail; fingers of the hands short; nails lunated, very slender; two pectoral mammae; cœcum much developed.

The Galeopitheci are but imperfectly known. They hang suspended by their hind legs from the branches of trees; feed on insects, and probably small birds. They move with difficulty on the ground, but climb trees with surprising facility, and spring from the one to the other, supported in their flight by the extension of the membrane around their body. The largest species known is not bigger than a young cat. The extremities are entirely enveloped in this singular membrane, which extends even to the nails of the toes. They are nocturnal or crepuscular animals, and suspend themselves during the day as the bats. They inhabit some of the islands of the Indian Archipelago.

G. rufus, Geoff. Desm. (*Lemur volans*. Lin.) Fur red, without spots. About a foot long. Pelew Islands.—*Audeb. Hist. Galeop.* pl. 1.

G. variegatus, Geoff. Desm. Cuv. Fur red-brown, variegated above, spotted with white on the extremities. About six inches long. Supposed by some naturalists to be merely a variety of the preceding. The Moluccas.—*Audeb. Galeop.* pl. 2.

G. Ternatensis, Geoff. Desm. Fur of a gray red, deeper above than below ; tail slightly spotted. Smaller than the preceding. Isle of Ternate.—*Seba*, i. t. 58, fig. 2, 3.

FAMILY II.—VESPERTILIONES.

Fingers of the hands excessively elongated, and supporting very fine membranes, with the thumb alone separate, but not opposable.

This family have their fore-arms and their fingers excessively lengthened, forming with the membrane by which they are connected wings similar to those of birds. Bats fly very high and very quick. Their pectoral muscles have a thickness proportioned to the movements they are intended to execute, and the sternum has a ridge for their attachment, as in birds. The thumb is short, and armed with a crooked nail, by which these animals suspend themselves and climb. The hind feet are feeble, divided into five unequal toes, all furnished with nails. Their intestines have no cæcum. Their eyes are excessively small, but their ears are often very large, and form with their wings a large membranous surface, almost naked, and so sensible, that bats are able to direct their flight, probably by the different impressions of the air, even after their eyes have been extracted. Bats are nocturnal animals, which in our climate are torpid in winter. They suspend themselves during the day in dark or obscure places. They bring forth usually two young, which they hold fast to their breast.

1st Division.—*Molar teeth without sharp points*

Gen. 25. PTEROPUS, Briss. Cuv. Geoff. Desm.—*Vespertilio*, Lin.

Incisors $\frac{4}{1}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{6}$ — $\frac{5}{6}$ = 34. Molars with the crown truncated obliquely, and marked with a longitudinal furrow ; head long and conical ; ears short, simple, without auricles ; no crest or nasal appendage ; tail short or none ; interfemoral membrane sloped off. An additional phalange and nail on the index finger of the wings ; tongue papillous.

This genus is distinguished by their long and conical head, their slender and pointed muzzle, their small and simple ears, and by the smallness of the interfemoral membrane. They have little or no tail, and the posterior extremities are simply bordered, but not united. They are the only bats which have the second and third finger of the hand provided with a nail, and with the phalanx belonging to it, and the only ones which are deprived of the second external ear. Their tongue is rough and papillous, and their teeth resemble those of apes.

* *Without a tail.*

P. Javanicus, Desm. Leschenault. The Javanese Bat. Neck above of a smoky red ; remainder of the fur black ; white hairs mixed with the black hairs of the back.

The *Pteropus Javanicus* is the largest of the genus, in adult subjects the spread of the wings being fully five feet, and the length of the body one. It is extremely abundant in the lower parts of Java, and lives in society. Numerous individuals select a large tree for their resort, and, suspending themselves with the claw of their posterior extremities to the naked branches, afford a very singular spectacle. They pass the greater part of the day in sleep, hanging motionless. Soon after sunset they gradually quit their hold, and direct their course to the forests, villages, and plantations, devouring indiscriminately every kind of fruit not protected from their incursions.

P. edulis, Geoff. Desm. The Eatable Bat. Entirely blackish ; back

covered with close and shining hair. Body ten inches long, the extended wings about four feet.—Indian Islands.

The flesh of this species is white, delicate, and remarkably tender, and is regarded by the inhabitants of Timor as a delicacy.

P. Edwardsii, Desm. (*Vespertilio vampyrus*, Lin.) Large Bat of Madagascar. Fur red; back of a chestnut-brown.—*Edwards' Birds*, pl. 180.

P. vulgaris, Geoff. Desm. (*Vesp. vampyrus*, Lin.) The common Roussette. Body covered, particularly on the belly, with thick and coarse hair, of a deep black; face reddish, as well as the sides of the back. Body about ten inches long; wings extended three feet.—*Buff.* x. t. 14.

Var. A. Of a bright chesnut or pale yellow.—Mauritius.

P. rubricollis, Geoff. Desm. (*Vesp. vampyrus*, Lin.) The red-collared Roussette. Fur of a gray brown; neck red. Body about eight inches long; extended wings two feet. Inhabits Isle of France.—*Buffon*, x. pl. 17.

P. griseus, Geoff. Desm. The gray Roussette. Fur of a gray red; head and neck red. About six and a half inches long; extended wings about 18 inches.—Inhabits the Isle of Timor.—*Ann. Mus.* xv. pl. 6.

P. Leschenaultii, Desm. Fur of a fawn ash-colour on the back; a little variegated with white under the belly; whitish points at the base of the membranes of the wings; extended wings about 18 inches.—Inhabits Pondicherry.

P. rostratus, Horsfield, Desm. The Dog-bat of Java. Muzzle elongated; no tail; fur of a pale brown. Body three inches long; extended wings 11 inches.—Inhabits Java.

** *With a tail.*

P. stramineus, Geoff. Desm. Lesser Ternate Bat, Penn. Fur reddish yellow; tail very short. Body about five inches long; extended wings two feet wide. Inhabits Timor and Ternate.—*Penn. Synop.* t. 31, fig. 1.

P. Ægyptiacus, Geoff. Desm. Egyptian Roussette. Hair woolly, and of a brown gray-colour. Body about five inches long; extended wings 20 inches.

P. amplexicaudatus, Geoff. Desm. Long-tailed Roussette. Fur reddish gray; tail the length of the thigh, and half enveloped in the interfemoral membrane. Four inches long; extended wings 16 inches. Inhabits Timor.—*Ann. Mus.* xv. pl. 4.

P. marginatus, Geoff. Desm. Fur olive brown; a white band around the ears. Length three inches; extended wings 11 inches.—*Ann. Mus.* xv. pl. 5.

P. minimus, Geoff. Desm. The Kiodote. Hair woolly and of a lively red; tongue extensible. Body three inches long; spread of the wings ten inches.—Inhabits Java.

*** *With wings upon the back.*

P. palliatus, Geoff. Desm. Membrane of the wings attached to the dorsal line, having the appearance of a mantle. Body about four inches long; wings 14 inches; length of tail $6\frac{1}{2}$ inches.

Gen. 26. CEPHALOTES, Geoff.—*Vespertilio*, Pallas. Gmel.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{4}-\frac{5}{4}$, = 32. Superior incisors isolated, lower incisors nearer together; the posterior molars with a large crown without tubercles or ridges; head conical; no crests or nasal leaf; ears short; index finger short, and wanting the nail in one species; tail very short; membrane of the wings rising from the dorsal line; tongue papillous.

C. Peronii, Geoff. Desm. No nail on the index finger of the hand; about six inches long; extended wings about two feet.—Timor.

C. Pallassii, Geoff. Desm. (*Vespertilio cephalotes*, Lin.) With a nail in the index finger of the hand. Three inches and a half long; spread of the wings 14 inches. Inhabits Moluccas.—Pallas, *Spic. Zool. fas. iii. t. 1 and 2.*

2d Division.—*With pointed molars.*

Gen. 27. MOLOSSUS, Geoff. Cuv.—*Vespertilio*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{3}-\frac{4}{3}$ = 26. Superior incisors bifid, converging, inferior very small, crowded before the canines, and each terminated by two little points; molars large, the crown rough with points; head large; muzzle naked, gibbous; nostrils open before, bordered; ears large and united; no crest or nasal leaves; tongue soft; interfemoral membrane narrow and terminated squarely; tail long.

M. rufus, Geoff. Desm. Fur deep chesnut above, lighter below; muzzle short and thick. Body about three inches long; spread of the wings about a foot.

M. ater, Geoff. Desm. Fur black, shining above; muzzle more slender than the preceding. About three inches long.

M. obscurus, Geoff. Desm. Fur blackish brown above, obscure below, the hairs being white at their origin. Nearly four inches long; spread of the wings nearly a foot.—Inhabits Paraguay.

M. longicaudatus, Geoff. Desm. Bull-dog Bat. (*Vespertilio molossus*, Lin.) Fur fawn ash-coloured; a band of skin extending from the point of the muzzle to the forehead; tail almost as long as the body. About two inches long. Inhabits Martinique.—Schreber, t. 59.

M. fusciventer, Geoff. Desm. (*Vesp. molossus*, Lin. var. β) Fur ash brown above, cinereous below, except the belly, which is brown in its middle. Body two inches long.

- M. castaneus*, Geoff. Desm. Fur chestnut above, whitish below ; a band extended from the muzzle to the forehead. Body nearly five inches long ; spread of the wings 13 inches.—Paraguay.
- M. laticaudatus*, Geoff. Desm. Fur obscure brown above, less deep below ; tail bordered on each side by a prolongation of the interfemoral membrane. Body about four inches long.—Paraguay.
- M. crassicaudatus*, Geoff. Desm. Fur brown cinnamon-colour, brighter below than above ; tail bordered on each side by a prolongation of the interfemoral membrane. Three inches and a half long ; spread of the wings about ten inches.—Paraguay.
- M. amplexicaudatus*, Geoff. Desm. Fur blackish, fainter below than above ; tail entirely enveloped in the interfemoral membrane. Size of the common bat. Cayenne.—*Buff. Supp.* vii. pl. 75.
- M. acuticaudatus*, Desm. Tail long, almost entirely enveloped in the interfemoral membrane ; fur brown black. Body about an inch and a half long ; wings very long.—Brazil.
- M. ursinus*, Spix. Body black ; jaws robust ; ears falling over the forehead. Inhabits Brazil.—*Spix, Braz.* t. 35, fig. 4.
- M. nasutus*, Spix. Nose elongated ; ears falling over the forehead ; body above brown black, below brown ; tail half enveloped in the membrane. Inhabits Brazil.—*Spix, Braz.* t. 35, fig. 7.
- M. fumarius*, Spix. Body blackish brown ; face, ears, and wings very black. Inhabits Brazil.—*Spix, Braz.* t. 35, fig. 5, 6.

Gen. 28. NYCTINOMUS, Geoff.

Incisors $\frac{2}{4}$, canines $\frac{1}{1}-1$, molars $\frac{4}{3}-\frac{1}{3}$, = 28. Upper incisors conical and contiguous ; inferior very small ; molars with pointed tubercles ; nose flat, on a level with the lips, which are deeply cleft and wrinkled ; ears large, united, and lying on the face ; auricle exterior ; tail long, enveloped by the membrane at its base ; wings large ; thumb very short ; index finger without phalanges ; hind feet covered with very long hair.

- N. Ægyptiacus*, Geoff. Desm. Fur red above, brown below ; tail slender ; no muscular bands in the interfemoral membrane, which envelopes the half of the tail. Body about three inches long. Inhabits Egypt.—*Geoff. Egypt.* pl. 2, No. 2.
- N. Bengalensis*, Geoff. Desm. Tail pretty thick ; muscular bands in the interfemoral membrane. Size of the preceding. Two incisors in each jaw according to Buchanan.—*Lin. Trans.* v. t. 13.
- N. acetabulosus*, Geoff. Desm. Fur of a brown black ; interfemoral membrane enveloping two-thirds of the tail. About ten inches long. Island of Mascareigne.
- N. dilatus*, Horsfield. Blackish brown, paler underneath ; wings dilated ; tail slender, half enveloped in the interfemoral membrane, which is furnished with a few muscular bands.—Java.

N. tenuis, Horsfield. Blackish brown; wings of great length, and very narrow; tail slender, half enveloped in the interfemoral membrane, the edge of which is folded and furnished with muscular fibres.—Inhabits Java.

N. Braziliensis, Geoff. Of a cinereous brown colour, lighter on the lower parts, varying also from yellow to black in different individuals. Upper lip not so deeply notched as in the Egyptian species; ears with folds or wrinkles.—*Isid. Geoff. Ann. des Sciences*, 1824.

N. ? murinus. Body blackish above, brown underneath; wings, ears, and head black. Interfemoral membrane destitute of muscular bands. Described by Griffiths from Gray's MSS.

Gen 29. CHEIROMELES, Horsfield.

Incisors $\frac{2}{2}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{4}{4}$ — $\frac{4}{4}$, = 26. Face conical; ears distant and spreading; operculum short, semicordate; blunt; interfemoral membrane short; tail exserted; thumb distinct, claw flat, fringed on the edge with bristles.

C. torquatus, Horsfield. Neck covered with longish hairs; back naked and dotted. Indian Archipelago.—*Horsf. Java*, No. vii.

Gen. 30. STENODERMA, Geoff.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{4}{4}$ — $\frac{4}{4}$, = 28. Nose simple; ears of medium size, lateral and isolated; auricle interior; interfemoral membrane rudimentary, bordering the legs; no tail.

S. rufa, Geoff. Desm. Fur red uniform chestnut; ears medium size, oval, a little hollowed at the external border. Body about three inches long; spread of the wings ten inches.

Gen. 31. NOCTILIO, Geoff. Cuv.—*Vespertilio*, Lin.

Incisors $\frac{4}{2}$, canines $\frac{1}{1}$ —, molars $\frac{4}{4}$ — $\frac{4}{4}$, = 26. Canines very strong; molars crowned with pointed tubercles; muzzle short, gibbous, cleft, and furnished with warts or fleshy tubercles; nose without appendages; ears small, lateral; interfemoral membrane very large; tail enveloped at its base; nails of the hind feet very robust.

N. unicolor, Geoff. Desm. (*Vespertilio leporinus*, Lin.) Peruvian Bat, Shaw. Fur of a uniform reddish fawn colour. Size of a rat. Inhabits Brazil, Paraguay, &c.—*Shaw*, i. pl. 41.

N. dorsatus, Geoff. Desm. (*Pteropus leporinus*, Erxleb.) Fur of a yellowish fawn colour, with a whitish band along the back; body four inches long; spread of the wings 16 inches.—S. America.

N. albiventer, Geoff. Desm. Back reddish; belly white. A little smaller than the preceding.

Griffith supposes the last two to be only varieties of the *Noctilio unicolor*, and makes a separate species of the *N. albiventer*, Spix, on the authority of his figure.

N. rufus, Spix. Body red ; the legs and ears nearly naked. Inhabits Brazil.—*Spix, Braz. f. 35, f. 1.*

Gen. 32. PHYLLOSTOMA, Geoff. Lin. Cuv.

Incisors $\frac{1}{1}$, canines $\frac{1}{1}$, molars $\frac{5}{5}$ — $\frac{5}{5}$, or $\frac{5}{6}$ — $\frac{5}{6}$, = 32 or 34. Lateral incisors very small, the intermediate ones broader ; head long and conical ; nose with two nasal crests, one like a leaf, the other of a horse-shoe form ; ears large, naked, not united. Auricle internal, dentated ; eyes small and lateral ; tongue rough with horny papillæ ; tail and interfemoral membrane more or less developed.

These bats occasionally suck the blood of animals, but the wounds they make are neither very dangerous nor painful. “ Sometimes,” says d’Azara, “ they will bite the crests and beards of fowls while asleep, and suck the blood. The fowls generally die in consequence of this, as a gangrene is engendered in the wounds. They bite also horses, mules, apes, and horned cattle generally on the buttocks, shoulders, or neck, as they are better enabled to arrive at these parts from the facilities afforded them by the mane or tail. Nor is man himself secure from their attacks. On this point, indeed, I am enabled to give a very faithful testimony, since I have had the ends of my toes bitten by them four times while I was sleeping in cottages in the open country. The wounds which they inflicted, without my feeling them at the time, were circular, and rather elliptical, their diameter was trifling, and their depth so superficial as scarcely to penetrate the cutis. It was easy also, on examination, to perceive that these wounds were made by suction, and not by puncture, as might be supposed. The blood that is drawn in cases of this description does not come from the veins or from the arteries, because the wound does not extend so far, but from the capillary vessels of the skin, extracted thence, without doubt, by these bats, by the action of sucking or licking. No one in our neighbourhood fears these animals, or gives himself any trouble about them ; notwithstanding a prevalent and most absurd report, that, previously to sucking the blood of their victim, they flap their wings upon the part intended for banquet, for the purpose of lulling and deadening its sensibility.—*Hist. Nat. of Paraguay*, ii. 273.

* *With a tail, but always shorter than the interfemoral membrane.*

P. crenulatum, Geoff. Desm. Nasal appendage with dentated margins ; end of the tail free. About two inches long ; extended wings about a foot.—*Ann. Mus. xv. pl. 10.*

P. elongatum, Geoff. Desm. Nasal leaf with smooth margins ; end of the tail free. About three inches long ; spread of the wings 15 inches.—*Ann. Mus. xv. pl. 9.*

P. hastatum, Geoff. Desm. (*Vespertilio hastatus*, Lin.) Nasal leaf with smooth borders ; tail wholly enveloped in the interfemoral membrane. Nearly four inches long ; spread of the wings about a foot and a half. A series of warts in the form of a V on the base of the under lip. Inhabits Guiana.—*Ann. Mus. xv. pl. 11.*

P. planirostra, Spix. Head thick, depressed above ; side of the nose tubercular ; front of the nasal leaf free, pendulous ; lips annulated on the edges ; chin short, flattish. Body nearly four inches long. Inhabits Brazil.—*Spix, Braz. 36. f. 1.*

** *Without a tail.*

P. perspicillatus, Geoff. Desm. (*Vesp. perspicillatum*, Lin.) Spec-

tacle Bat. Nasal leaf short, hollowed near its point; two white bands from the nostrils to the ears. About three inches long; extended wings 17 inches.—*Buff. Supp.* vii. pl. 74.

P. lineatum, Geoff. Desm. Nasal leaf entire; four whitish stripes upon the face, and one on the back. Body nearly three inches long; spread of the wings 13 inches.—Inhabits Paraguay.

The number of teeth in this species presents an anomaly; according to Azara there are no incisors in the lower jaw.

P. rotundum, Geoff. Desm. Nasal leaf entire, rounded at its extremity; fur reddish brown. About three inches long; spread of the wings nearly 14 inches.—Inhabits Paraguay.

P. lilium, Geoff. Desm. Nasal leaf entire, as high as broad, and narrow at its base; jaws elongated. Two inches three lines long; spread of the wings one foot.—Inhabits Paraguay.

P. spectrum, Geoff. Desm. (*Vespertilio spectrum*, Lin.) The Vampire. Nasal leaf entire, less broad than high, jaws elongated. Five inches and a half long.—Inhabits South America.

This species, the largest of the genus, is celebrated in the narratives of travellers for sucking the blood of men and animals while asleep.

Gen. 33. VAMPYRUS, Spix.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{4}-\frac{4}{4}$, = 28. Incisors conical, the two intermediate in the upper jaw being largest; the first molar with one tubercle, the others with three; mouth rather obtuse, lower jaw verrucose; tail short, involved in the membrane, except the apex.

V. cirrhosus, Spix. Bearded Vampire. Head oblong; nasal leaf pendulous; lips and chin bearded; spread of wings $4\frac{1}{2}$ inches. Inhabits Brazil.—*Spix, Braz. f.* 36.

V. soricinus, Spix. Body less robust than the preceding; mouse-colour on the back, brownish gray underneath; chin smooth. Inhabits Brazil.—*Spix, Braz. f.* 36. fig. 2, 6.

V. bidens, Spix. Two incisors in the lower jaw; blackish brown above; mouse-coloured underneath.—*Spix, Braz. f.* 65.

Gen. 34. GLOSSOPHAGA, Geoff. Desm.—*Phyllostoma*, Cuv. —*Vespertilio*, Pall. Lin.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{3}{3}-\frac{3}{3}$, = 24. Incisors regularly arranged; canines of medium size; molars similar to the *Phyllostomæ*; head long and conical; tongue very long, narrow, extensible; nose supporting a little spear-shaped crest; tail more or less long, sometimes wanting; interfemoral membrane very small or none.

G. soricina, Desm. Geoff. (*Vesp. soricinus*, Lin.) Interfemoral membrane broad; no tail. Body two inches long; spread of the wings eight inches. Inhabits Surinam.—*Ann. Mus.* xv. pl. 11.

G. amplexicaudata, Geoff. Desm. Interfemoral membrane broad;

tail short and terminated by a nodosity; fur blackish brown. Inhabits Brazil and Rio de Janeiro.—*Mem. du Mus.* iv. pl. 18.

G. caudifer, Geoff. Desm. Interfemoral membrane very short; the tail extending beyond it; fur blackish brown. Inhabits Brazil.—*Mem. du Mus.* iv. pl. 17.

G. ecaudata, Geoff. Desm. Interfemoral membrane very short; no tail; colour obscure brown. Inhabits Brazil.—*Mem. de Mus.* iv. pl. 18.

Gen. 35. MORMOOPS, Leach.

Incisors $\frac{1}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 32. Two intermediate incisors in upper jaw largest; ears large, close, furnished with auricles; nasal appendage erect, confluent with the ears; index finger two joints, middle finger four, the others three; tail enveloped in membrane except the last joint.

M. Blainvillii, Leach. Nasal leaf plaited; ears bilobed above; labial processes divided. Inhabits Jamaica.—*Lin. Trans.* xiii. pl. 7.

Gen. 36. MEDATEUS, Leach.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, = 30. The two intermediate incisors in the upper jaw largest; two nasal appendages, one vertical, the other lunate and horizontal; no tail; lips warty.

M. Lewisii, Leach. Blackish; nasal leaf vertical, spear-shaped; ears rounded; spread of wings seventeen inches.—*Lin. Trans.* xiii. 81.

Gen. 37. MEGADERMA, Geoff. Cuv. Desm.—*Vespertilio*, Lin. Shaw.

Incisors $\frac{0}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, = 26. Superior canines triangular, the inferior bent backwards; ears very large, and united upon the forehead; auricle much developed; nasal crests to the number of three, one vertical, one horizontal or folliculated, and the third of a horse shoe form; no tail; interfemoral membrane truncated; wings very large, with the third finger without the nail joint.

M. trifolium, Geoff. Desm. Nasal leaf oval, follicle large, each the fifth of the length of the ears; auricle of a trefoil shape; body about three inches long; spread of the wings ten inches. Inhabits Java.—*Ann. Mus.* xv. pl. 12.

M. spasma, Geoff. Desm. (*Vesp. spasma*, Lin.) Leaf heart-shaped; follicle large and similar; auricle of a half heart shape. Nearly four inches long. Inhabits Isle of Ternate.—*Shaw*, i. pl. 42.

M. lyra, Geoff. Desm. Leaf rectangular; follicle one half smaller; body nearly three inches long; spread of the wings about a foot.—*Ann. Mus.* xv. pl. 12.

M. frons, Geoff. Desm. Nasal leaf oval, half the length of the ears. Above two inches long.—Inhabits Senegal.

Gen. 38. RHINOLOPHUS, Geoff. Cuv.—*Vespertilio*, Lin.

Incisors $\frac{2}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$, = 30. Superior incisors very small, separated, and often falling, inferior bilobed; molars with sharp-pointed crowns; nose with a crest of a horse shoe form before, surmounted by a leaf; ears distinct; interfemoral membrane large; tail long and entirely enveloped; two pectoral mammæ, and two pubial warts, having the appearance of mammæ, but without lactiferous glands.

R. unihastatus, Geoff. Desm. (*Vespertilio ferrum-equinum*, Lin. Var. A.) Nasal leaf double; the posterior spear-shaped; the anterior sinuous at the margin and extremities. Nearly three inches long; spread of the wings 14 inches. Inhabits old quarries and caves in Europe.—*Buff.* viii. pl. 20. fig. 1 and 2.

R. bihastatus, Geoff. Desm. (*Vesp. ferrum-equinum*, Lin. Var. B. *Vesper minutus*, Mont.) Nasal leaf double, both spear-shaped; ears deeply hollowed. Generally smaller than the preceding. Europe. B.—*Leach*, *Zool. Mis.* iii. p. 121.

R. tridens, Geoff. Desm. Nasal leaf simple, terminated by three points; body about two inches long; spread of the wings nearly nine inches. Inhabits Egypt.—*Geoff. Egypt.* ii. pl. 2.

R. speoris, Desm. (*Rhinolope crumenifère*, Peron and Lesueur—*Vesp. speoris*, Schn.) Nasal leaf simple, with the terminal margin rounded; a purse or cavity on the forehead. Island of Timor.—*Peron*, *Voy.* pl. 35.

R. diadema, Geoff. Desm. Nasal leaf simple, terminal border rounded; no purse on the front; tail the length of the leg; body about four inches long. Island of Timor.—*Ann. Mus.* xx. pl. 6.

R. Commersonii, Geoff. Cuv. Nasal leaf simple, the terminal margin rounded; no pouch on the forehead; tail one half less long than the leg. A little smaller than the preceding. Near Fort Dauphin, Madagascar.—*Ann. Mus.* xx. pl. 5.

R. affinis, Horsf. Yellowish brown above, yellow underneath, deeper on the throat and breast; tail shorter than the legs; septum of the nose crooked; ears large, with an accessory lobe at the base.

R. minor, Horsf. Lead-colour or silvery above, gray below; septum, tail, and ears like the preceding; spread of wings 9 inches.

R. nobilis, Horsf. Brown above varied, with gray underneath; nasal membrane extended across the nose in the form of a shelf; tail as long as the legs; spread of wings $19\frac{1}{2}$ inches.

R. larvatus, Horsf. Deep-brown above, with a golden lustre; membrane blackish-brown with a yellowish tint, varying according to the disposition of the light; spread of wings $12\frac{1}{2}$ inches.

- R. vulgaris*, Horsf. Brown above, uniform gray beneath; tail a little longer than the leg; upper nasal membrane transverse; ears patulous, with a hairy lobule at the base; spread of wings $12\frac{1}{2}$ inches.
- R. deformis*, Horsf. Brown above, gray underneath; skull elongated and depressed; upper nasal membrane transverse; large, erect, approximate ears. Spread of wings 12 inches.
- R. insignis*, Horsf. Dark brown above; tail a little longer than the legs; an elongated frontal sinus; mouth contracted, ascending transversely; ears large and patulous, with the extremity circular. This and the six preceding species inhabit Java.

Gen. 39. NYCTERIS, Geoff. Cuv.—*Vespertilio*, Lin.

- Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{4}-\frac{4}{4} = 30$. Superior incisors bilobed, very small, contiguous; inferior trilobed; molars with pointed tubercles; a deep longitudinal furrow on the forehead; nostrils covered each by a moveable operculum; interfemoral membrane large, and comprising the tail, which is terminated by a bifurcated cartilage in form of a T.
- N. Geoffroyi*, Desm. Ears very large; tragus spiral; under lip with a large wart at its extremity, between two elongated cushions in the form of the letter V; fur of gray brown above, lighter gray below. Nearly two inches long; spread of the wings nine inches. Senegal, &c. in Africa.—*Geoff. Egypt. ii. pl. 1. fig. 2.*
- N. Daubentonii*, Geoff. Desm. (*Vespertilio hispidus*, Gmel.) Ears pretty large; tragus very small; inferior lip simple; fur of a reddish brown above, yellowish white below. About $1\frac{1}{2}$ inch long; spread of the wings about seven inches.—*Buff. x. pl. 20. fig. 1, 2.*
- N. Javanicus*, Geoff. Desm. Fur of a bright red on the upper parts of the body, of a reddish ash-colour upon the inferior. About $2\frac{1}{2}$ inches long.—Inhabits Java.

Gen. 40. RHINOPOMA, Geoff.

- Incisors $\frac{2}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5} = 28$. Inferior incisors separated; nose long, conical; truncated at the extremity, and surmounted by a little leaf; nasal openings narrow, transverse and operculated; forehead concave; ears large, united, and lying on the face; interfemoral membrane narrow and truncated; tail long, enveloped only at its origin.
- R. microphylla*, Desm. (*Vesp. microphyllus*, Brunich.) Fur ash-coloured; tail very long and slender; nostrils with a valve as in seals. Two inches long; spread of the wings seven inches.—*Egypt.*
- R. Caroliniensis*, Geoff. Desm. Fur brown; tail long, and pretty thick. About two inches long, spread of the wings eight inches.—Inhabits South Carolina.

Gen. 41. TAPHOZOUS, Geoff. Desm.—*Vespertilio*, Schreb.

- Incisors $\frac{0}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5} = 26$. A furrow on the

nose, as in the two preceding genera, but not provided with operculi ; upper lip very thick ; tail composed of six vertebræ, free above the membrane ; interfemoral membrane large.

- T. *Senegalensis*, Geoff. Desm. Fur brown above ; brown ash-coloured below ; auricle rounded. Body $2\frac{1}{2}$ inches long.—Africa.
- T. *Mauritanus*, Geoff. Desm. Fur chestnut above, reddish below ; auricle terminated by a sinuous border. Body $3\frac{1}{2}$ inches long ; spread of the wings above nine inches.—Isle of France.
- T. *perforatus*, Geoff. Desm. Fur gray red above ; ash-coloured below ; auricle dolabriform. Three inches long, spread of the wings nine inches. Inhabits Egypt at Ombos and Thebes, in the tombs of the kings.—*Geoff. Egypt. ii. pl. 3. fig. 1.*
- M. Desmarest is of opinion that this and the T. *Senegalensis* are the same.
- T. *lepturus*, Geoff. Desm. (*Vespertilio lepturus*, Schreb.) Fur gray, paler below than above ; auricle very short and obtuse ; a fold towards the tail, formed by the membrane of the wings. Body about an inch and a half long. Surinam.—*Schreb. Saugh. i. pl. 57.*
- T. *rufus*, Harlan. Fur of a reddish cream colour ; membranes of a dusky red. Four inches long ; spread of the wings 12 inches. Inhabits Pennsylvania.—*Harlan, Faun. Americ. 23.*

Gen. 42. MYOPTERIS, Geoff.

Incisors $\frac{2}{2}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, = 26. Inferior incisors bilobed ; nose simple ; forehead flat, without leaves, membranes, or furrow ; muzzle short and thick ; ears large, tail long, half enveloped at its base, free at the extremity.

- M. *Daubentonii*, Geoff. Desm. Upper part of the head and body of a brown colour ; below of a dirty white, with a slight tint of fawn colour. Body three inches in length.—Country unknown.

Gen. 43. CELENO, Leach.

Incisors $\frac{2}{2}$, the upper acuminate and simple, the lower formed as it were of four columns ; molars $\frac{8}{8}$, the anterior teeth in both jaws acuminate, the three posterior acutely tuberculated.

- C. *Brooksiana*, Leach. Back ferruginous ; belly and shoulders yellowish ; membrane black ; ears acuminate, distinct.—*Lin. Trans. xiii. 70.*

Gen. 44. AELLO, Leach.

Incisors $\frac{2}{4}$, molars $\frac{8}{12}$, the two upper acuminate, the third bifid, and the fourth with three edges ; in the lower jaw, the three anterior acuminate, the three posterior bifid.

- A. *Cuvieri*, Leach. Isabella ferruginous yellow ; wings dark brown ; ears short, approximate, broad ; no auricle ; tail not reaching beyond the membrane.—*Lin. Trans. xiii. 71.*

Gen. 45. SCOTOPHILUS, Leach.

Incisors $\frac{4}{6}$; in the upper jaw the two lateral teeth shorter; molars $\frac{8}{8}$, furnished with acuminate processes.

S. *Kuhlii*, Leach. Ferruginous, with the ears, nose, and wings brown; ears distinct, auricle small; tail reaching to the end of the membrane.—*Lin. Trans.* xiii. pl. 1.

Gen. 46. ARTIBEUS, Leach.

Incisors $\frac{4}{4}$, the two intermediate in the upper jaw largest; in the lower jaw truncated, the intermediate ones reeded in front; molars $\frac{8}{10}$, the posterior ones small.

A. *Jamaicensis*, Leach. Dark-coloured above, mouse-coloured below; ears, nasal appendages, and membranes dark brown; two nasal appendages, the one horizontal, the other vertical and acuminate; no tail. Inhabits Jamaica.—*Lin. Trans.* xiii. pl. 1.

Gen. 47. DIPHYLLA, Spix.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, scarcely exerted; molars $\frac{4}{4}-\frac{4}{4}$? or $\frac{8}{8}-\frac{8}{8}$? short, apex erenulated; nose with two short erect truncated leaves placed close together; posterior legs nearly as long as the arms; tail and interfemoral membrane deficient.

D. *ecaudata*, Spix. Body with woolly, hair back fuscous brown; head and abdomen brownish gray; wings blackish, nearly naked; face near the ears naked. Brazil.—*Spix, Sim. Braz.* 136, fig. 7.

Gen. 48. MONOPHYLLUS, Leach.

Incisors $\frac{4}{0}$, the two intermediate the largest, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{6}-\frac{5}{6}$, the two first in the upper jaw distant, the rest tuberculated on both edges; the second and third in the lower jaw with a space between them.

M. *Redmani*, Leach. Brown above, mouse-coloured below; membranes, ears, and nasal appendage brown; nasal leaf erect, acute; ears round; beard elongated. Jamaica.—*Lin. Trans.* xiii. pl. 1.

Gen. 49. DYSOPE, F. Cuv.

Incisors $\frac{2}{4}$, upper close, elongate, elliptical; canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$.

D. *mops*. Inhabits India.—*F. Cuv. Dents. de Mam.* 49.

Gen. 50. NYCTOPHILUS, Leach.

Incisors $\frac{2}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{4}-\frac{4}{4}$. Upper incisors short and conical, the under equal; first molar in the upper jaw acute, with one tubercle; the second and third with four tubercles, and the fourth with three.

N. *Geoffroyii*, Leach. Back dirty brown, under parts whitish; ears

broad ; membrane blackish ; two nasal appendages, erect, the posterior one largest ; tail as long as the interfemoral membrane.—*Lin. Trans.* xiii. pl. 1.

Gen. 51. THYROPTERA, Spix.

Teeth.....? Body slender ; nosesimple ; wings very narrow, extending to the tarsus ; interfemoral membrane not extending beyond the feet ; tail long, free.

T. tricolor, Spix. Body above fuscous brown, beneath pure white ; wings and legs black. Brazils.—*Spix, Sim. Braz.* t. 36. f. 69.

Gen. 52. PROBOSCIDEA, Spix.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5}$. Upper incisors small and diverging, the under ones lobed ; the front molar small, the others tuberculated ; wings narrow ; tail long ; half involved in the membrane.

P. saxatilis, Spix. Body above variegated with gray and brown, below mouse-coloured ; wings and feet fuscous brown. Inhabits rocky places on the shores of St Francis, Brazil.—*Spix, Sim. Braz.* t. 35. f. 8.

P. rivalis, Spix. Body smaller ; above fuscous brown, beneath pale brown. Inhabits shores of the Amazons, Brazils.—*Spix, Sim. Braz.* 62.

Gen. 53. VESPERTILIO, Lin. Pall. Cuv. Geoff.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, or $\frac{5}{6}-\frac{5}{6}$, = 32 or 36. Superior incisors separated in pairs, cylindrical and pointed ; inferior near together, with a bilobed edge, bent forwards ; canines of medium size ; anterior molars simply conical ; posterior crowned with points ; nose without membranous leaves or furrows, or wrinkles ; tongue smooth, not protractile ; membranes much extended ; tail entirely enveloped in the interfemoral membrane ; fur soft and thick ; sebaceous glands under the skin of the face of different forms and dimensions, according to the species.

Sub-Gen. 1. VESPERTILIO, Geoff. Ears of medium size, lateral and isolated ; four, five, or six superior molars, and three or six inferior, on each side.

V. murinus, Lin. The Common Bat. Ears oval, the length of the head ; auricles falciform ; fur of the adults reddish brown above, gray white below ; of the young ash-coloured. Body $3\frac{1}{2}$ inches long ; spread of the wings, 15 inches. Inhabits Europe in church towers, &c. but never in trees.—*Penn. Brit. Zool.*

V. Bechsteinii, Leisler, Kuhl, Desm. Ears rounded at the extremity, longer than the head ; auricle falciform, a little bent outwards towards its point ; upper part of the body of a red-gray,

under part white. Body about two inches long ; spread of the wings 11 inches. Inhabits Germany on trees in forests, never in houses.—*Kuhl, Deutsch. Flederm.* pl. 22.

- V. Nattereri*, Kuhl, Desm. Ears oval, pretty broad ; a little longer than the head ; fur of a gray brown colour above, white below ; members of a smoky gray ; interfemoral membrane festooned. Two inches long, spread of the wings $9\frac{1}{2}$ inches.—*Kuhl*, pl. 23.
- V. Caroliniensis*, Geoff. Desm. Ears oblong, of the size of the head, tragus semicordate ; fur chestnut brown above, and yellow below. Body about two inches long ; spread of the wings $9\frac{1}{2}$ inches. Inhabits South Carolina.—*Ann. Mus.* viii. pl. 47.
- V. noctula*, Lin. Desm. Ears oval-triangular ; shorter than the head, body fawn-colour ; membranes brown black. Body about three inches long ; spread of the wings $14\frac{1}{2}$ inches. Inhabits Europe.—*F. Cuv.* No. 38, t. 3.
- V. serotinus*, Lin. Desm. (*Vespert. noctula*, Geoff.) Ears oval-triangular, shorter than the head, auricles semicordate ; fur dark chestnut in the males, and lighter in the females ; membrane of the wings black. Nearly three inches long ; spread of the wings about 13 inches. Inhabits Europe. B.—*Ann. Mus.* viii. pl. 47, 48.
- V. Leisleri*, Kuhl, Desm. Ears oval-triangular, short ; hair long, of a chestnut colour at the point and deep brown at the base ; inferior surface of the membrane of the wings the length of the arm very hairy. Body about $9\frac{1}{2}$ inches long ; spread of the wings 11 inches.—Inhabits Germany.
- V. Schreibersii*, Kuhl, Desm. Ears small, with an internal hairy border ; fur gray ash-colour, paler below, and often mixed with yellowish white. About $2\frac{1}{2}$ inches long ; spread of the wings 10 to 11 inches.—Inhabits Germany.
- V. discolor*, Kuhl, Desm. Ears short rounded, oval ; hair, of the back brown, with the point white ; that of the under part of the body of a dirty white. Body about two inches long ; spread of the wings 10 or 11 inches. Inhabits South of Germany.—*Kuhl*, 43.
- V. pipistrellus*, Lin. Desm. Ears oval-triangular, shorter than the head ; hair blackish brown above, belly of a brown fawn-colour. Body little more than an inch long ; spread of the wings upwards of six inches.—Inhabits France, Germany, and Italy.
- Var. A. with the points of the hairs ash-coloured.—*Geoff. Eryp.* i. fig. 3.
- V. emarginatus*, Geoff. Desm. Ears oblong, size of the head, and furrowed at their exterior border ; fur reddish gray above, ash-coloured below. Two inches long ; spread of the wings nine inches. Inhabits England.—*Ann. Mus.* viii. pl. 47, 48.
- V. mystacinus*, Kuhl, Desm. Ears pretty large, oblong, wrinkled and furrowed exteriorly ; hair fine and close set, forming on each side of the upper lip a kind of moustache ; fur brown, tipped with brown red. About $1\frac{1}{2}$ inch long ; spread of the wings seven to eight inches. Inhabits Germany.

- V. Kuhlii*, Natterer, Desm. Ears simple, almost triangular ; fur of a bright red, brown above, fawn-coloured below ; interfemoral membrane very hairy. About $1\frac{3}{4}$ inch long ; spread of the wings $8\frac{1}{2}$ inches.—Found near Trieste in Germany.
- V. Daubentonii*, Kuhl, Desm. Ears small ; fur of a red-gray above, and whitish below. Body about two inches long ; spread of the wings 9 to $9\frac{1}{2}$ inches. Inhabits Germany.—*Kuhl*, t. 25. fig. 2.
- V. pictus*, Lin. Desm. Striped Bat, Penn. Ears oval, shorter than the head ; fur of a bright red yellow on the back ; two bands of bright yellow along the fingers of the wings, which are of a chestnut colour. Body two inches long ; spread of the wings seven inches. E. Indies.—*Ann. Mus.* viii. pl. 48.
- V. lasiurus*, Lin. Desm. Rough-tailed Bat, Penn. Ears oval, shorter than the head ; fur variegated with yellowish gray and lively red. Nearly two inches long. Cayenne.—*Ann. Mus.* viii. pl. 47.
- V. Borbonicus*, Geoff. Desm. Ears oval-triangular, a half shorter than the head ; fur red above and whitish below. Body nearly three inches in length. Isle of France.—*Ann. Mus.* viii. pl. 46.
- V. Nigrita*, Geoff. Gmel. Senegal Bat, Penn. Ears oval-triangular, very short ; the third of the length of the head ; fur fawn-coloured above, ash-brown below. Body about four inches long ; spread of the wings 18 inches. Inhabits Senegal.—*Ann. Mus.* viii. pl. 47.
- V. maximus*, Desm. (*V. nasutus*, Shaw.) Ears oval, shorter than the head ; muzzle long and pointed ; fur chestnut above ; of a bright yellow on the flanks, and of a dirty white on the belly. Body about $5\frac{1}{2}$ inches long ; spread of the wings nearly 18 inches. Inhabits Guiana.—*Buff.* vii. pl. 73.
- V. pygmæus*, Leach. Brown deeper on the back and head ; muzzle short and obtuse ; ears shorter than the head, broad at the base, rounded ; tragus linear. Expanded wings about five inches. Inhabits England.—*Zool. Journ.* iv. f. 22.
- V. Braziliensis*, Spix. With black wings. Inhabits Brazil.—*Spix*, *Braz.* t. 36, f. 8.
- V. Hilarii*, Isid. Geoff. Ears small and triangular ; tail as long as the fore-arm ; interfemoral membrane naked. Inhabits Brazil.—*Ann. des Sciences Nat.* iii. 440.
- V. Polythrix*, Isid. Geoff. Ears small, notched at the external margins ; tail as long as the fore-arm ; interfemoral membrane with scattered hairs on the upper side ; face hairy. Inhabits Brazil.—*Ann. des Sciences Nat.* iii. 440.
- V. lævis*, Isid. Geoff. Ears long ; tail as long as the body ; face partly naked. Inhabits Brazil.—*Ann. des Sciences Nat.* iii. 445.
- V. Temminckii*, Horsfield. Incisors $\frac{2}{6}$. Head cuneate, top and sides flat ; ears shorter than the head, oblong, rounded ; tragus elongate, falcate ; fur silky ; hair very short, olive brown, beneath dirty yellow. Inhabits Java.—*Horsfield's Java*, No. 8.

- V. adversus*, Horsfield. Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$. Head wedge-shaped, high behind; muzzle broad; ears erect; tragus linear; fur rather woolly, above shining brown, below whitish ash-coloured. Inhabits Java.—*Horsfield's Java*, No. 8.
- V. Hardwickii*, Horsf. Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6}$. Head globose; tumid; muzzle short, depressed; ears very broad, concave; tragus linear, erect; fur woolly, above brown ash-coloured, below dirty gray. Inhabits Java.—*Horsfield's Java*, No. 8.
- V. tralatitius*, Horsf. Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{6}-\frac{5}{6}$. Head wedge-shaped; face bristly; ears large, flat; tragus linear, erect, blunt; fore-arm long; fur soft, sooty black. Body three inches long; expanded wings ten inches. Java.—*Horsf. Java*, No. 8.
- V. imbricatus*, Horsf. Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$. Head and muzzle short, broad; ears broad, obtuse; tragus short, semilunar; fur shining, fulvous. Inhabits Java.—*Horsf. Java*, No. 8.
- V. villosissimus*, Geoff. Desm. Ears like those of a rat; interfemoral membrane hairy in its middle; fur of a pale brown. Body about four inches long; spread of the wings 11 inches.—Inhabits Paraguay.
- V. ruber*, Geoff. Desm. Ears much pointed; hair short, cinnamon-coloured on the upper parts, and fawn-coloured on the inferior parts. Body about three inches long; spread of the wings about nine inches.—Inhabits Paraguay.
- V. albescens*, Geoff. Desm. Ears sharp pointed; fur almost black, spotted with white above, and obscure below. Body about $2\frac{1}{2}$ inches long; spread of the wings nearly nine inches. Inhabits Paraguay.—*Ann. Mus.* viii. pl. 18.
- V. Brasiliensis*, Desm. Ears medium size, of an elongated form; membranes narrow and black; fur dark brown, very soft, and silky, shaded with chestnut. Spread of the wings 11 to 12 inches.—Inhabits Brazil.

Sub-Gen. 2. *PLECOTUS*, Geoff. Ears larger than the head, often much developed, united to one another by their base; four or five superior molars, and four to six inferior, on each side.

- V. auritus*, Lin. Geoff. Desm. The Long-eared Bat. Ears almost as long as the body; fur gray, deeper above than below. Body nearly two inches long; spread of the wings $10\frac{1}{2}$ inches. Inhabits Europe. B.—*Shaw*, i. pl. 40.

Var. A. Smaller than the preceding, with a redder fur. Egypt.

Var. B. Larger than the specimens found in France, and the colour deeper. Austria.

- V. barbastellus*, Lin. Geoff. Desm. Ears very large, united, triangular, hollowed at their exterior margin; fur of deep brown; the points of the hairs yellow; membranes of a brown black. Body two inches long; spread of the wings $10\frac{1}{2}$ inches. Inhabits France and Germany.—*Ann. Mus.* viii. pl. 46.

V. Maugei, Desm. Ears very large, united; hollowed exteriorly towards the point, which is rounded; fur of a blackish brown above, and of a clear brown below; posterior parts of the body white; membranes gray. A little larger than the preceding.—Porto-Rico.

V. Timorensis, Geoff. Desm. Ears large, united at their internal base by a little membrane; fur blackish brown above and ash-coloured brown below. About $2\frac{1}{2}$ inches long; spread of the wings 10 inches. Island of Timor.—*Ann. Mus.* viii. pl. 47.

V. velatus, Isid. Geoff. Chestnut-coloured above, grayish-brown beneath; tail as long as the body, entirely involved in the membrane; ears long, with two longitudinal plaits hanging over the face; spread of wings $13\frac{1}{2}$ inches.—*Ann. Sci. Nat.* iii. 446.

Gen. 54. ATALAPHA, Rafinesque.—*Vespertilio*, Gmel. Geoff.

No incisors; nose simple, without crests or membranes; ears separate, and furnished with auricles; tail long, surpassing the interfemoral membrane a little, or comprised in it.

A. Americana, Rafinesque. (*Vesp. Noveboracensis*, Penn.) New York Bat. Ears short and broad, rounded; tail comprised entirely within the interfemoral membrane.—United States.

A. sicula, Rafinesque. Ears as long as the head; tail projecting by an obtuse point.—Inhabits Sicily.

ORDER IV.—FERÆ. *Carnassiers*, Cuv.

Four extremities proper for walking; three kinds of teeth; mammæ abdominal, varying in number; stomach simple, membranous; intestines short.

This order is composed of unguiculated quadrupeds, which possess, in common with Man and the Quadrumana, three kinds of teeth. They all live chiefly on animal matter, and this more exclusively as their molar teeth are more or less formed for cutting. Those which have these teeth in part or wholly tuberculous, subsist more or less on vegetable substances; and those which have them covered with conical points live chiefly upon insects. The articulation of their inferior jaw, directed cross-wise, and shutting as a hinge, prevents its having a horizontal movement, the motion being limited to shutting and opening. Their brain, though furrowed, has no third lobe; their orbit is not separated by a temporal depression; their cranium is confined, and the zygomatic arch widened and raised, to give more room and strength to the muscles of the jaws. Their predominating sense seems that of smell, and the pituitary membrane is generally extended upon numerous bony laminae. Their fore-arm turns with less facility than among the quadrumanous animals. Their intestines are also less voluminous, on account of the substantial nature of their aliment, and to avoid the putrefaction which animal matter would experience in remaining too long in an elongated canal.

FAMILY I.—INSECTIVORA.

Feet short, armed with stout nails; those of the hind feet always with five toes, having their sole entirely bearing upon

the ground ; fore-feet generally with five toes ; molar teeth crowned with pointed tubercles ; canines sometimes very long, sometimes very short ; incisors variable in number ; body covered with hair or prickles.

1st Division.—*Two long incisors in front, followed by other incisors, or false canines, shorter than the molars.*

Gen. 55. ERINACEUS, Lin. Pall. Geoff. Cuv. &c.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{4}-\frac{5}{4}$, = 34. Intermediate upper incisors separate, cylindrical ; canines smaller than the molars ; body thick, covered with prickles above and stiff hairs below, capable of rolling up into a ball ; muzzle pointed ; ears medium size, or very short and rounded ; toes armed with strong nails ; tail short, or none ; ten mammæ, six pectoral, and four ventral ; no cœcum ; clavicles complete.

E. *Europæus*, Lin. Common Hedgehog. Ears short ; prickles about an inch long, in diverging clusters, with the points white. About a foot long.—*Penn. Quad. tab. 28, fig. 3.*

Var. A.—Nose prolonged like that of a hog.

Var. B.—Nose shorter, spinous mantle less extended.

The hedgehogs are nocturnal animals, concealing themselves during the day, and coming out at night to feed. Their food is chiefly insects and their larvæ, snails, eggs, and fruits, and some even eat with impunity the cantharides and other vesicating insects. They become extremely fat towards autumn, and pass the winter in torpidity in holes previously prepared. Their gait is heavy, and their intelligence very limited. Their period of gestation is not exactly known ; but the young at birth have their eyes and ears closed. When alarmed they roll themselves up like a ball, and present a surface of erected spines to their enemies. The common hedgehog is found in all the temperate parts of Europe.

E. *auritus*, Geoff. Pallas. Hedgehog of Egypt. Muzzle short ; ears two-thirds the length of the head. A little smaller than the hedgehog of Europe. Astracan, Egypt, &c.—*Griff. An. King. 170.*

E. *Malaccensis*, Lin. Desm. (*Hystrix brachyura* Lin.) Muzzle short ; ears pretty short, pendant ; spines very long, directed parallel to one another. Eight inches long. Java, &c.—*Shaw, i. pl. 121.*

Gen. 56. SOREX, Lin. Cuv. Desm.

Incisors $\frac{2}{2}$, spurious canines, or lateral incisors $\frac{5}{2}-\frac{5}{2}$, or $\frac{4}{2}-\frac{4}{2}$, true molars $\frac{4}{3}-\frac{4}{3}$, = 28 or 30. Upper middle incisors hooked and dentated at the base ; molars crowned with points ; head much elongated ; nose prolonged and moveable ; ears short, rounded ; eyes small, but perceptible ; tail more or less long, often angular ; feet with weak toes, separated, furnished with crooked nails ; teats six or eight ; sebaceous glands on the flanks.

S. *araneus*, Lin. Shrew Mouse. Ears large and naked, with two folds or lobes within ; fur mouse-coloured, paler below ; tail square, a little shorter than the body. About two inches long, weighing three drachms. Inhabits Europe. B.—*Shaw, i. pl. 118.*

- S. Daubentonii*, Blumenbach, Geoff. (*S. fodiens*, Pall.) The Water Shrew. Ears provided with three small valves, capable of shutting it entirely; toes of the feet bordered with stiff hairs; tail square-shaped, a little shorter than the body; fur blackish above, white below. Three inches long. Europe.—*Shaw*, i. pl. 118.
- S. tetragonurus*, Geoff. Desm. Square-tailed Shrew. Ears short; fur blackish above and ash brown below; tail long, square. Two inches three lines long. France.—*Ann. Mus.* xvii. pl. 2. fig. 3.
- S. constrictus*, Hermann, Desm. Flat-tailed Shrew. Ears very small, entirely concealed by the hair; fur of a black ash-colour; tail flattened at its base and point, round in its middle. Two inches seven lines long. Inhabits France.—*Ann. Mus.* xvii. pl. 3. fig. 1.
- S. leucodon*, Hermann, Desm. Back brown; belly and flanks white; tail slightly tetragonous. Two inches ten lines long. Environs of Strasburg.—*Ann. Mus.* xvii. 181.
- S. lineatus*, Geoff. Desm. Tail round, strongly carinated below; fur of a blackish brown, paler below; throat ash-coloured; a spot upon each ear, and a little white line upon the forehead. Two inches long. Inhabits France.—*Ann. Mus.* xvii. 181.
- S. remifer*, Geoff. Desm. Tail square at its base, compressed at its point; fur of a blackish brown above, lighter beneath.—*Ann. Mus.* xvii. pl. 2. fig. 1.
- S. collaris*, Geoff. Fur black; a white collar around the neck. Inhabits the islands at the mouth of the Meuse.—*Mem. Mus.* i. 309.
- S. Indicus*, Geoff. Desm. Tail round, half as long as the body; fur short, gray brown, tinted above with red; ears naked. Six inches long, the largest of the genus. Inhabits India.—*Mem. Mus.* i. pl. 15.
- S. Capensis*, Geoff. Desm. Tail round, red, half as long as the body; fur ash-coloured, shaded with fawn-colour. Three inches eight lines long. Cape of Good Hope.—*Petiver*, t. 23. fig. 9.
- S. myosurus*, Pall. Geoff. Tail round, thick, almost naked; muzzle gibbous; fur white. Three inches nine lines long.—*Ann. Mus.* xvii. pl. 3. fig. 2, 3.
- S. parvus*, Say. Brownish cinereous above, beneath cinereous; teeth blackish; tail short. About $2\frac{1}{2}$ inches long. Inhabits Missouri.—*Long's Exped.* i. p. 163.
- S. brevicaudus*, Say. Blackish plumbeous above, lighter beneath; teeth blackish; tail short, robust. Inhabits Missouri.—*Long's Exped.* i. 164.
- S. Etruscus*, Savi. Ashy gray, white underneath; ears round; tail large, subquadrate. Inhabits Tuscany.—*New Giornal*, i. 60.
- Gen. 57. MYGALE, Cuv. Geoff.—*Castor*, Lin.—*Sorex*, Pallas.
- Incisors $\frac{6}{8}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{6}-\frac{7}{6} = 44$. Inferior incisors with the two middle ones smallest; canines not distinct in

their form from the lateral incisors and first molars ; muzzle prolonged, moveable, and endowed with great sensibility ; no external ears ; eyes very small ; toes palmated ; nails long and crooked ; tail scaly, compressed laterally.

M. Moscovitica, Geoff. (*Castor moschatus*, Lin.) Musk Rat of Russia. Tail shorter than the body, scaly, almost naked, striated at its base ; fur brown above, white below. Eight inches long. Inhabits Southern Russia.—*Schreb.* t. 159.

M. Pyrenaica. Tail longer than the body, cylindrical for the greater part of its length, but vertically compressed at its extremity ; fur brown above and gray below. Body four inches long. Inhabits the Pyrenees.—*Ann. Mus.* xvii. pl. 4. fig. 1.

Gen. 58. TUPAIA, Raffles.

Incisors $\frac{2}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{6}-\frac{7}{6}$, = 38. Body elongated ; head triangular, attenuated, blunt ; eyes projecting, and ears large ; tail very long ; four ventral teats ; diurnal.

T. tana, Raffles. Head long ; muzzle pointed ; fur above reddish brown, spotted with black beneath, and an oblique red line on each shoulder. Inhabits Sumatra.—*Horsfield's Java*, No. 3.

T. Javanica, Raffles. Head long ; muzzle slightly pointed ; tail very long ; fur brown, speckled with gray above, gray below, with a whitish gray oblique line on the shoulder. Inhabits Java.—*Horsfield's Java*, No. 3.

T. ferruginea, Raffles. Muzzle slightly pointed ; fur ferruginous. Inhabits Java.—*Horsfield's Java*, No. 3.

Gen. 59. SCALOPS, Geoff. Cuv.—*Sorex*, Lin.—*Talpa*, Penn.

Incisors $\frac{2}{4}$, conical teeth $\frac{3}{3}-\frac{5}{3}$, molars $\frac{5}{3}-\frac{3}{3}$ = 30. Lower incisors conical, straight, with two very small intermediate incisors ; first and third upper conical teeth on each side larger than the second ; molars crowned with sharp tubercles ; muzzle prolonged and cartilaginous ; eyes very small ; external ears none ; feet short, pentadactyle, the anterior very broad ; nails long, flattened, proper for digging ; tail short.

S. Canadensis, Desm. (*Sorex aquaticus*, Lin. *Talpa fusca*, Penn.) Nose much prolonged, terminated by a cartilaginous button ; feet and tail of the mole ; fur gray brown. About six inches long. —Inhabits United States from Canada to Virginia.

Gen 60. CHRYSOCHLORIS, Cuv. Geoff. Desm.—*Talpa*, Lin.

Incisors $\frac{2}{4}$, conical teeth $\frac{5}{3}-\frac{3}{3}$, molars $\frac{6}{5}-\frac{6}{5}$ = 40. Intermediate lower incisors very small ; fore-feet short, with three toes armed with strong nails ; hind-feet pentadactyle ; eyes very small ; no external ear ; no tail.

C. Capensis, Desm. (*Talpa Asiatica*, Gmel.) Fur brown, with

under certain aspects brilliant copper and green metallic reflections; five toes on the hind-feet; no tail. About $4\frac{1}{2}$ inches in length. Inhabits the Cape of Good Hope.—*Schreb.* tab. 157.

C. rufa, Desm. (*Talpa rubra*, Lin.) Red Mole. Fur of a reddish approaching to bright ash-colour; hind feet with four toes; tail short. A little larger than the mole of Europe. Inhabits America.—*Penn. Quad.* 486.

Gen. 61. CONDYLRURA, Illiger, Desm.—*Sorex*, Lin.—*Scalops*, Geoff.—*Talpa*, Cuv.

Incisors $\frac{6}{4}$, conical teeth or spurious molars $\frac{5}{3}-\frac{5}{3}$, true molars $\frac{4}{3}-\frac{4}{3} = 40$. Six superior incisors anomalous, the two intermediate very broad; muzzle much prolonged, furnished with membranous crests around the opening of the nostrils; no external ears; eyes excessively small; body thick; feet pentadactyle; the nails on the fore-feet strong.

C. cristata, Desm. (*Sorex cristatus*, Lin.) Radiated Mole. Nostrils surrounded by a circular membrane of a stellated form; tail shorter than the half of the body. About four inches long. Inhabits Canada and United States.—*Penn. Quad.* tab. 28. fig. 1.

C. longicaudata, Desm. (*Talpa longicaudata*, Erxleb.) Long-tailed Mole. No nasal crests; tail half the length of the body. Body from four to six inches long. Inhabits North America.—*Penn. Quad.* tab. 18. fig. 2.

C. macroura, Harlan. Nose surrounded by a circular fringed membrane; tail nearly the length of the body, strangulated at its base, slightly compressed, tapering. Five inches long.—*Faun. Amer.* 39.

2d Division.—*Four large separated canines with small incisors between them.*

Gen. 62. TALPA, Lin. Cuv. Desm. &c.

Incisors $\frac{6}{8}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{6}-\frac{7}{6} = 44$. Body thick; head elongated, pointed; muzzle with cartilaginous button; eyes very small; no external ears; pentadactylous; fore-feet very large, with toes united to the nails, which are strong and slightly arched.

T. Europea, Lin. Desm. The Mole. Fur soft, black, shining; tail short. About five inches long.—*Shaw*, i. pl. 117.

Var. A. Skin marbled with white and black spots.—Var. B. Fur entirely white.
Var. C. Fur yellowish.—Var. D. Fur ash-coloured.

Gen. 63. CENTENES, Illig. Desm.—*Setiger*, Cuv. Geoff.—*Erinaceus*, Lin.

Incisors $\frac{6}{6}$ or $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 38$ or 40. Canine teeth very strong; body covered with spines, but not capable of being formed into a ball; feet pentadactyle; no tail.

C. setosus, Desm. (*Erinaceus setosus*, Lin.) Spines long and flexi-

ble ; four hollowed incisors in each jaw. From ten inches to a foot long. Madagascar and the Isle of France.—*Buff.* xii. pl. 56.

M. F. Cuvier has found in a young individual of this species two small supernumerary incisors in the upper jaw, situated before the canines, which he presumes fall out with age.

C. spinosus, Desm. (*Erinaceus caudatus*, Lin.) Spines short and stiff on the upper parts of the body, bristles and hair on the lower parts; four incisors only in the lower jaw. Inhabits Madagascar.—*Buff.* xii. pl. 57.

C. semispinosus, Desm. (*Erinaceus semispinosus*, Cuv.) Body covered with bristles and spines, mixed, banded with yellow and black ; six incisors above and below ; canines slender and crooked. Four inches long. Inhabits Madagascar.—*Buff. Sup.* iii. pl. 37.

FAMILY II.—CARNIVORA.

Six incisors in each jaw ; molars generally edged, sometimes tuberculous, never rough with pointed tubercles on their crown ; canines very strong.

1st TRIBE. PLANTIGRADA.—*Sole of the foot entirely resting on the ground.*

Gen. 64. *URSUS*, Lin. Cuv. Geoff., &c.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4 \text{ to } 7}{4 \text{ to } 7} = 32 \text{ to } 44$. Incisors of the lower jaw on the same line ; posterior molars very strong, with a square crown and blunt tubercles ; feet pentadactyle, armed with strong nails ; body thick ; tail short ; mammae six, two pectoral and four ventral.

U. Arctos, Lin. Common Brown Bear. Forehead convex above the eyes ; muzzle truncated ; fur brown. Upwards of four feet long. Inhabits Europe, and temperate parts of Asia.—*Shaw*, i. pl. 102.

The bear lives in solitary places and in the deepest recesses of forests. In winter it retires to caverns or the hollow trunks of large trees, where it exists in a kind of torpidity, occasionally sucking its fore-paws. Its food consists chiefly of vegetable substances ; and it never attacks man or animals but when pressed by hunger. In fighting it raises itself upon its hind legs, and presses its enemy by its fore-feet to its breast.

Var. A.—White bear of Europe ; an albino variety.

Numerous other varieties of this species are noticed, founded upon shades of colour more or less black, fawn-coloured, or white.

U. cinereus, Desm. (*Ursus ferox*, Lewis and Clark.) Gray Bear. Fur long, cinereous gray, very thick, especially around the neck and back of the head. About $8\frac{1}{2}$ feet long.—Inhabits United States.

U. Americanus, Pall. Desm. Cuv. Black Bear. Nose on the same line as the forehead, which is gibbous ; fur black, shining, not curled. Four feet eight inches long. Inhabits North America.

U. maritimus, Lin Desm. The Polar Bear. Head elongated ; cranium flattened ; neck long ; hair long, soft, and white. About $7\frac{1}{2}$ feet long. Inhabits coasts of the Polar Sea.—*Shaw*, i. pl. 103.

U. labiatus, Blainville, Desm. (*Bradypus ursinus*, Shaw.) Lips extremely long and extensible; hair black; passing in some places to brown. Size of the brown bear. India.—*Shaw*, i. pl. 47.

U. Malayanus, Raffles. Malay Bear. Black, with a large heart-shaped patch of yellowish white on the throat. Fur short and smooth. Inhabits India.—*Horsfield's Java*, No. 4.

U. Thibetanus, F. Cuv. The Thibet Bear. Black, with the under jaw white; pectoral patch forked, and continued to the middle of the belly. Inhabits Thibet.—*F. Cuv. Mam.*

U. spelæus, (fossil.) Blumen. Cuv. Forehead much elevated above the root of the nose, presenting two convex projections. In calcareous caverns of Germany.—*Cuv. Oss. Foss.* iv. pl. 3. figs. 1, 2.

U. Arctoideus, (fossil.) Blumen. Cuv. Cranium similar to that of the black bear of America, but with less vertical elevation, and the muzzle more elongated. Found in the same places as the foregoing.—*Cuv. Oss. Foss.* iv. pl. 3, figs. 3, 4.

Gen. 65. PROCYON, Storr. Cuv. Desm.—*Ursus*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 40$. Lower incisors on the same line; the three posterior molars tuberculous; feet pentadactyle; nails sharp; muzzle pointed; ears small; tail long; six ventral mammæ.

P. lotor, Cuv. Desm. (*Ursus lotor*, Lin.) The Raccoon. Fur brown gray; muzzle white, with a brown streak across the eyes; tail annulated with brown and white. Body about two feet long. Inhabits N. America, Mexico, and West Indies.—*Shaw*, i. pl. 105.

Var. A. White where the others are gray or yellowish, and lively red where they are black.—Var. B. With a brown spot on the throat.—Var. C. Body covered above with thick white hair; below with whitish yellow.

P. cancrivorus, Geoff. Desm. (*Ursus cancrivorus*, Cuv.) Fur fawn-coloured, mixed with gray and black, pretty uniform above, of a whitish yellow below; annulations of the tail faintly marked. About $2\frac{1}{2}$ feet long. Inhabits S. America.—*Buff. Suppl.* vi. pl. 32.

Gen. 66. NASUA, Storr. Cuv.—*Ursus*, Briss.—*Viverra*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 40$. Lower incisors on the same line; three posterior molars tuberculous; feet pentadactyle, armed with strong nails; nose much prolonged, and moveable; tail long; six ventral mammæ.

N. rufa, Desm. F. Cuv. The Red Coati. Fur generally of a brilliant red; muzzle grayish black, with three white spots about each eye. About a foot long. S. America.—*F. Cuv. Mam.* liv. 1.

N. fusca, Desm. (*Viverra nasica*, Lin.) The Brown Coati. Fur brown or fawn-coloured above, of a yellowish-gray or orange yellow; three white spots about each eye; a longitudinal white line along the nose. Size of the preceding. S. America.—*Schreb.* t. 118.

Var. A.—Fur more fawn-coloured than brown. The Coati Mondí of Marcgrave.

Gen. 67. POTOS, Geoff. Desm.—*Viverra*, Gmel. Schreb.—*Lemur*, Penn.

Incisors $\frac{6}{6}$ canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5} = 36$. Lower incisors on the same line; the three posterior molars with tuberculous crowns; pentadactyle; toes armed with crooked nails; muzzle short; head rounded; tail long and prehensile.

P. caudivolvulus, Desm. (*Viverra caudivolvula*, Schreb.) Yellow Maucoco, Penn. Fur silky, of a brownish very bright fawn-colour. About 19 inches long. S. America.—Penn. Quad. t. 16.

Gen. 68. TAXUS, Geoff.—*Meles*, Storr. Cuv.—*Ursus*, Lin.

Incisors, $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{6}-\frac{5}{6} = 38$. The first molar very small, the second and third pointed, the fourth cutting on the external side, the fifth tuberculous and large; body low upon the legs; pentadactyle; nails robust; tail short; an anal pouch, containing a fetid secretion.

T. vulgaris, Desm. (*Ursus meles*, Lin.) The Badger. Fur of a gray brown above, black below; a longitudinal black band on each side of the head, passing around the eye and ear. About two feet three inches long. Inhabits Europe. B.—Shaw, i. pl. 106.

T. Labradorica, (*Ursus Labradoricus*, Gm.) Pale yellowish-gray; belly and throat white, with a longitudinal band on the side of the head, passing over the eye and the ear. Inhabits Hudson's Bay.—Shaw, i. pl. 106.

Gen. 69. GULO, Cuv. Illig.—*Mustela*, *Ursus*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{6}-\frac{5}{6}$ or $\frac{4}{6}-\frac{4}{6} = 36$ or 38. Molars, the three first in the upper, and the four in the lower jaw, small, succeeded by a large carnivorous tooth, and a small tuberculous one at the back; body low, head moderately elongated; ears short and round; tail short; pentadactyle; toes with crooked nails; no anal pouch.

G. arcticus, Desm. (*Ursus gulo*, Lin. Pall.) The Wolverine, Penn. Body pretty thick; fur of a fine deep chestnut-colour, with a disc, almost black upon the back. About 26 inches long. Inhabits northern Europe and America.—Shaw, i. pl. 104.

Var. A. Differs from the preceding in the colours being paler.

The voracity of this animal, though excessive, has been greatly exaggerated. It is about the size of the badger, and the body is heavy. When a sufficient supply of small quadrupeds and birds cannot be procured, it is said to conceal itself on the horizontal branch of some tree, where it will drop on deer or other animals passing beneath, holding its situation and sucking their blood till exhaustion renders them an easy prey. According to Dr Richardson, it is extremely annoying to the hunters, by devouring their stores of provision and carrying off the baits of their marten traps. It has been known to visit daily a line of traps extending upwards of two miles, and to rob the whole of them of the baits, and of such animals as had been caught.

G. vittatus, Desm. (*Viverra vittata*, Lin.) Body much elongated; fur black, spotted with white; top of the head and neck gray; a white band running from each side of the forehead to the shoulders. About one foot long. S. America.—*Wern. Mem.* iii. pl. 19, fig. 5.

G. barbatus, Desm. (*Mustela barbata*, Lin.) Body elongated; fur of a black brown; a large spot of a yellowish white colour covering the under part of the neck and throat. Inhabits Guiana, Brazil, &c.—*Brown's Jamaica*, pl. 49, fig. 1.

G. Capensis, Desm. (*Viverra Capensis*, Lin.) Body thick and short; fur gray above, black below, with a longitudinal white line on each side from the ears to the origin of the tail. About three feet four inches long. Inhabits Cape of Good Hope.—*Sparman, Act. Stockh.* 1777, tab. 4, fig. 3.

G. orientalis, Horsfield. Fur glossy reddish brown; white patches about the head and throat, and a long pyramidal white patch from the top of the head to the middle of the spine. Body 16 inches long. Inhabits Java.—*Horsf. Java*.

G. larvatus, Griff. The Masked Glutton. Fur olive brown and gray; tip of the tail and feet black; white patches about the face. Larger than the polecat.—*Griffith's Anim. King.* ii. 281.

G. ferrugineus, Griffiths. Fur chestnut colour; tail black; head broad and depressed; eyes near the nostrils.—*An. King.* ii. 282.

2d TRIBE. DIGITIGRADA.—Walking on the toes.

1st Division.—With one tuberculous tooth behind the great carnivorous tooth of the upper jaw.

Gen. 70. MUSTELA, Lin. Cuv. Illig. Desm.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, or $\frac{5}{6}-\frac{5}{6}$, = 34 or 38. Body elongated; head small and oval; ears short and round; legs short; feet pentadactyle, armed with sharp hooked claws; no anal pouch.

Sub.-Gen. 1. PUTORIUS, Cuv.—Two false molars above, and three below; no interior tubercle on the great canine below; muzzle short; emit a fetid odour.

M. putorius, Lin. Desm. The Polecat, Penn. Fur brown; the interior hairs of a yellowish white; some white spots at the head and muzzle. About 18 inches long. Europe. B.—*Penn. Quad.* p. 213.

M. furo, Lin. Desm. The Ferret, Penn. Fur yellowish; eyes red-coloured. M. Cuvier thinks that the ferret is only a variety of the polecat. Body nearly 14 inches in length.—*Penn. Quad.* 214.

Var. A. Fur variegated with white, black, and fawn-colour.

Common in Spain, where it was imported from Africa. In Great Britain it exists only in a domesticated state.

M. Sibirica, Pall. Schreb. Desm. Fur of a pale fawn-coloured yellow on the lower parts; muzzle brown, around the nose white.

Similar in size to the preceding. Inhabits thick forests in Siberia.—*Pallas, Spic. Zool.* pl. 4, fig. 2.

M. Sarmatica, Pall. Desm. Fur of a ferruginous brown, spotted with yellow above; throat and belly black. About 13 inches long. Inhabits Poland and Russia.—*Pall. Spic.* xiv. t. 4, fig. 1.

M. vulgaris, Lin. Desm. The Weasel. Fur of a reddish brown above, white below. Body about $6\frac{1}{2}$ inches in length. Inhabits Europe, &c. B.—*Shaw*, i. pl. 98.

Var. A. (*M. nivalis*, Lin.) White, with some black hairs at the extremity of the tail.

A voracious animal, inhabiting the temperate and northern parts of the old world and North America. The white variety is found in Westrobothnia, Sweden, and in Russia and Siberia.

M. Africana, Desm. Body above of a reddish brown; below of a pale yellow, with a longitudinal narrow band of the first colour in the middle of the belly. Ten inches long. Inhabits Africa.

M. erminea, Lin. Desm. The Ermine in winter—The Stoat in summer. Fur in summer of a brown chestnut, paler above, white below; in winter fur white; tail always black at its extremity. About $9\frac{1}{2}$ inches in length. Common in the north of Europe.—*Shaw*, i. pl. 99.

M. lutreola, Pall. Desm. The Mink. Fur of a blackish brown; upper lip, chin, and under part of the neck white; feet semipalmated. Nearly a foot long. Europe.—*Pall. Spic. Zool.* xiv. pl. 31.

M. alpinus, Gebler. The Alpine Polecat. Fur sulphur yellow, brownish above; chin white. About a foot in length. Inhabits the Altaic Mountains.—*F. Gebler. Mem. Moscou*, vi. 213.

M. nudipes, F. Cuv. Java Ferret. Fur brilliant golden yellow; forehead and tip of tail yellow white; soles of the feet naked. About 11 inches long. Inhabits Java.—*F. Cuv. Mam.* No. 32. t. 3.

M. lutreocephala, Harlan. Fur brownish white, paler beneath; tail ferruginous brown. About 20 inches long. Inhabits United States.—*Harlan, Faun. Amer.* p. 63.

Sub.-Gen. 2. ZORILLES.—Muzzle short; two false molars above, three below; nails of the fore feet strong, and proper for digging.

M. zorilla, Lin. Desm. (*Mustela zorilla*, Lin.) Fur irregularly variegated with longitudinal black and white bands. Cape of Good Hope.—*Shaw*, i. 391.

Sub.-Gen. 3. MARTES.—A little tubercle on the lower large carnivorous tooth; a false molar above and below more than the *Putorius*.

M. martes, Lin. The Pine Marten. Fur brown, with a bright yellow spot under the throat. About 18 inches long. North of Europe. B.—*Shaw*, i. 410.

M. foina, Lin. The Beech Marten. Fur brown, below the throat and neck whitish. About 16 inches long. Europe and Western Asia. B.—*Buff.* vii. pl. 18.

- M. zibellina*, Lin. The Sable. Fur brown, whitish on the head, and gray on the throat; feet covered with fur to the ends of the toes. About 18 inches in length. Northern Asia.—*Schreb.* t. 136.
- M. vison*, Lin. Fur brown, with the point of the inferior jaw white, and the tail brown black; feet semipalmated. About 15 inches long. Inhabits Canada.—*Schreb.* t. 127.
- M. Canadensis*, Lin. Pekan Weasel, Penn. Head, neck, shoulders, and upper part of the back mixed gray and brown; nose, croup, tail, and members of a blackish brown; often a white spot on the throat. About 18 inches long. Canada.—*Schreb.* t. 134.
- M. rufa*, Desm. Geoff. Fur of a red chestnut, deeper above than below, and composed of hairs annulated with brown, chestnut, and yellow; tail brown at the tip. Probably a variety of the preceding.
- M. Pennantii*, Erxleb. The Fisher Weasel, Penn. Fur yellowish, topped with black; throat, belly, and legs brown; ears short, lighter at the tips; tail black, shining. About $2\frac{1}{2}$ feet long. North America.—*Penn. Quad.* No. 202.
- M. leucotis*, Griffiths. Fur dark brown; inside of ears white.—*Griff. An. King.* ii. 297.
- M. sinuensis*, Humb. The Zorra. Fur of a uniform blackish-gray; belly and interior of the ears white. About two feet two inches in length. Inhabits the warmer parts of New Grenada.

Gen. 71. MEPHITIS, Cuv.—*Viverra*, Lin.

Incisors $\frac{6}{8}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5} = 34$. Body elongated, arched; toes of the foot separated and armed with strong nails, the anterior formed for digging; tail long and bushy, or none.

The mephitic weasels are rather clumsy and not nearly so active as their congeners, and as their means of flight are limited, nature has provided them with a singular mode of defence in the ejection of a fetid liquor from their body. Young sporting dogs, unacquainted with the animal, sometimes pounce on them; but the dash of fetid liquid instantly forces them to retire. They whine, rub their noses in the earth, and will never again pursue another of the same species. The smell of this offensive liquor is so penetrating, that washing and baking clothes upon which it has been injected is found insufficient, and the intolerable smell is diffused to a considerable distance. Azara declares he was not able to endure the disgusting smell which a dog that had received it from one of the species a week before communicated to some furniture, although the dog had been washed and scrubbed with sand above twenty times.

M. Americanus, Desm. The Chinche. Fur soft, shining, marked with white longitudinal bands upon a blackish-brown ground; tail covered with very long tufted hair. About the size of the domestic cat.—*Shaw*, i. pl. 94.

Var. A.—With many white bands. The Ysqueipalt of Hernandez.

Var. B.—With nine white lines, and digitigrade. The Putois of Catesby.

Var. C.—With six white bands, and said to be plantigrade. Mousfette Conepatl, Buff.

Var. D.—With two white bands along the tail. Conepatl, Hernandez.

Var. E.—Glauton Mapurito, Humboldt. Fur of a deep-black; back with only one white band, which commences at the forehead and terminates at the half of the body. Its odour is insupportable.

- Var. F.—*Mephitis Chiliensis*, Geoff. With two white bands on the sides of the body, uniting behind the head and forming a crescent.
- Var. G.—*Vicerra mephitis*, Gmel. or Chinche of Buffon. With two very broad white bands posteriorly; forehead marked with a longitudinal white band.
- Var. H.—Feulilée's Chinche. With two white bands, which spread and terminate on the sides.
- Var. I.—Moufette Yagouaré of Azara. Fur of a brown-black and two white bands.
- Var. K.—Polecat of Kalm. The Skunk. Fur brown-black, with one longitudinal white line on the back and one on each side.
- Var. L.—Moufette Zorille. Fur black and white, with a fine tail.
- Var. M.—Body spotted with white and black. *Mafutiliqui* of the Indians.
- Var. N.—Male black; female black bordered with white. Louisiana.
- Var. O.—White, black, and fawn-coloured. Orthula of Mexico.
- Var. P.—Tail with black and white rings. Tepemaxtla, Hernandez.
- Var. Q.—*Gulo Quitensis*, Humboldt. Plantigrade. Body black and marked with two white bands, which extend from the top of the head to the tail.
- Var. R.—*Mephitis interrupta*, Rafinesque. Brown, with two short white bands, parallel to the head; eight bands on the back, of which the four anterior are equal and parallel, and the four posterior rectangular, and disposed in an opposite direction. About a foot long.—Louisiana.

M. *Javanensis*, Desm. (*Telagon*, F. Cuv.) Fur deep-brown; forehead with a white spot, extended into a dorsal line; tail very short, and covered with long hair. Body about 16 inches in length. Inhabits Java.—*Horsf. Zool. Res.* vi.

Made a new genus by Dr Horsfield, under the name of *Myadecus*.

Gen. 72. LUTRA, Desm. Cuv. Shaw, &c.—*Mustela*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{5}$ — $\frac{5}{5}$, or $\frac{5}{8}$ — $\frac{5}{8}$, = 36 or 38. Head large, and flattened; ears short; body long, low upon the legs, toes webbed; nails crooked; tail long, flattened horizontally.

L. *vulgaris*, Desm. (*Mustela lutra*, Lin.) The Otter, Penn. Fur brown above, and whitish below; tail more than half as long as the body. Inhabits Europe. B.—*Shaw*, i. pl. 100.

Var. A.—With a number of small round white spots on the flanks.

L. *Brasiliensis*, Geoff. Desm. (*Mustela lutris Brasiliensis*, Lin.) Fur brown, or fawn-coloured, with the throat white or yellowish. Rivers in Guiana, &c.—*Cuv. Reg. Anim.* iv. t. 4, fig. 3.

L. *Canadensis*, Sabine. (*Mustela Hudsonica*, Lacepede.) Canadian Otter. Fur glossy-brown; chin and throat dusky white; neck and head long; legs short; tail pointed, and as long as the body. Inhabits Copper Mine River.—*Franklin, Voy. Ap.* 653.

L. *insularis*, F. Cuv. Hairs scattered; body clear chestnut-brown; throat and chin yellowish-white. Inhabits Isle of Trinity.—*Dict. Sc. Nat.* xxvii.

L. *lataxina*, F. Cuv. Fur long, twisted, thick; brown-black above, pale bluish-gray below. Inhabits Carolina.—*Dict. Sc. Nat.* xxvii.

L. *enudris*, F. Cuv. Fur above clear bay, paler beneath; throat, and sides of the face nearly white.—*Dict. Sc. Nat.* xxvii.

L. *nair*, F. Cuv. Fur long, deep chestnut; lower part of the neck,

throat, and belly clear reddish-white ; a brown band on the cheeks under each eye. Inhabits Pondicherry.—*Dict. Sc. Nat.* xxvii.

L. inunguis, F. Cuv. Fur chestnut-brown above, deeper on the buttock, tail, and legs ; lower parts white ; toes large, semipalmated, without claws. Cape of Good Hope.—*Dict. Sc. Nat.* xxvii.

L. leptonyx, Horsf. Fur shining fulvous brown ; throat dull yellow ; claws short, blunt, nearly laminar. Inhabits Java.—*Horsf. Jav.* vii.

L. marina, Erxleb. Desm. The Sea Otter. Fur blackish, shining ; body very long ; tail about a third of the length of the body ; hind feet very short.—*Shaw*, i. pl. 101.

Var. A. With white head.—Dr Fleming, in his *Philosophy of Zoology*, makes a separate genus of this species under the name of *Enhydra*, and places it and the genus *Lutra* amongst with the seals.

2d Division.—*Two tuberculous flat teeth behind the great carnivorous tooth in the upper jaw.*

Gen. 73. CANIS, Lin. Cuv. Geoff.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{7}-\frac{6}{7} = 42$. The three first molars in the upper jaw, and the four in the lower, small, edged ; the great carnivorous tooth above bicuspid, with a tubercle on the inner side ; two tuberculous teeth behind each of the large carnivorous ones ; muzzle elongated ; tongue soft ; ears erect ; fore-feet pentadactylous ; hind feet tetradactylous ; teats inguinal and ventral.

* DOGS.—*Pupils of the eyes round.*

C. familiaris, Lin. Desm. Tail curved upwards ; muzzle more or less lengthened ; fur varying in the nature of the hair, and of various colours ; tail generally tipped with white.

The dog, distinguished by its curved tail, runs into endless varieties in point of size, form, and the colour and quality of the hair. The domestication of this animal is, in Cuvier's opinion, the most complete, the most singular, and the most useful conquest man has ever made. All the species has become his peculiar property ; and each individual, devoted to his master alone, accommodates itself to his manners, protects his goods, and remains attached to him till death. This connection arises not from constraint, nor from the want of man's protection ; for the dog has naturally powers of defence and attack superior to most of the quadrupeds, but from a species of confidence approaching to friendship. Its strength, its speed, and its smell, have made it a powerful ally in the subjugation of the other animals, and it is the only animal which has followed man through every quarter of the globe, and the only one whose existence and propagation does not seem to be determined by certain limitations of latitude.

Some naturalists have thought that the dog is derived from the wolf, and others that it has originated from a domesticated chacal, and there is no doubt but that both of these animals are capable of being tamed and rendered useful ; but dogs which have been left in uninhabited islands and become completely wild, neither resemble the one nor the other. The wild dogs, and those of people in the first stage of civilization, such as the inhabitants of New Holland, have their ears erect ; which has led to the supposition that the European races nearest the original type are the shepherd's dog and the Pomeranian dog ; but the comparison between their craniums approach them more to the *mâtin* of Buffon (*C. lanarius*, Lin.) and the Danish dog, the harrier, the pointer, and the turnspit, which differ but little from them except

in size and the proportion of the members. The greyhound seems most removed. The shepherd's dog and the Pomeranian wolf dog have the erect ears of the wild dogs, but with a greater developement of the cranium, which is still further developed in the Spaniel family, and with an increase of intelligence. M. Desmarest, from having remarked in an immense number of domesticated individuals, that when white is one of the colours of the tail, the tip is always white, and from having also remarked that all the wild species have the end of the tail white, is inclined to believe that this marked character is derived from the primitive race, and has descended to our domestic varieties. The Antarctic dogs lately brought to Europe were distinguished by the tip of the tail being white.

The young are born blind, and they attain their growth in two years. The period of gestation is two months, and they bring forth from six to twelve young. The dog is old at 15 years, and seldom lives beyond 20.

M. F. Cuvier divides the varieties of the dog into three groups, each differing materially in the shape of the head, and the length of the jaws and muzzle.

Section 1. *Matins*.—Head more or less elongated; parietal bones approaching in an insensible manner; condyles of the lower jaw in a line with the upper molar teeth.

Var. A.—C. F. *Australasicæ*, Desm. The Dingo. Size and form of the shepherd's dog, with the head resembling that of the fox.

Var. B.—C. F. *Sumatrensis*, Hardwicke. Muzzle like the fox: nose pointed, eyes oblique, ears rounded, very hairy; tail bushy, pendulous.—*Shaw*, i. t. 78.

Var. C.—C. F. *lanarius*, Lin. The Matin. Head elongated, forehead flat, ears erect at their base and half drooping. Crossed with the bull-dog the offspring is the English mastiff.

Var. D.—C. F. *danicus*, Desm. Body generally white, marked with numerous small round black spots.

Var. E.—C. F. *grajus*, Lin. The Greyhound. Forehead very low; muzzle much elongated; limbs long and slender, feet frequently wanting the fifth toe.

To this family belong the following subvarieties:—1. The Irish greyhound, of a brownish white colour and of large size.—2. The Scottish greyhound, with the hairs slightly curled and wiry.—3. The Russian greyhound, with long and thick hair, and tail twisted spirally.—4. The Italian greyhound.—5. The Turkish greyhound, with the skin nearly naked.

Section 2. *Spaniels*.—Head moderately elongated; parietal bones diverging.

Var. A.—C. F. *extrarius*. The Spaniel. Ears large and pendant; tail elevated; fur of varying length in different parts of the body; colour whitish, with brown or black patches. Employed in the chase as a setter, for which it is qualified by its exquisite powers of smell.

The subvarieties are the Alpine Spaniel, the Newfoundland Spaniel, the Calabrian dog, all of large size, and a number of smaller races: The group of Spaniels seem to have been originally from Spain, whence the name.

Var. B.—C. F. *aquaticus*, the Barbet Great Water Spaniel, or poodle. Two subvarieties, the Little Barbet and the Griffon.

Var. C.—C. *Gallicus*. The Harrier. Peculiar for its fine scent.

Var. D.—C. *avicularius*, the Pointer.

Var. E.—C. *vertagus*, the Turnspit.

Var. F.—C. *domesticus*, the Shepherd's dog.

Var. G.—C. *Pomeranus*, the Wolf dog.

Var. H.—C. *Sibiricus*, the Siberian dog.

Var. I.—C. *Borealis* the Esquimaux dog.

Var. K.—C. *Americanus*, the Alco.

Section 3. *Muzzles* more or less truncated; cranium much elevated; frontal sinuses large; condyles of the lower jaw placed above the line of the upper molars.

Var. A.—C. *molossus*, the Bull-dog.

Var. B.—*C. Anglicus*, the Mastiff.

Var. C.—*C. fricator*, the Pug-dog.

Var. D.—*C. Islandicus*, the Iceland dog.

Var. E.—*C. variegatus*, the little Danish dog.

Var. F.—*C. hybridus*, the shock dog.

Var. G.—*C. Britannicus*, the black and tan terrier. Sub-var. the Scottish terrier.

Var. H.—The Artois dog.

Var. I.—*C. Andalusia*, the Alicant dog.

Var. K.—*C. Ægyptius*, the Egyptian dog.

C. lupus, Lin. Desm. The Wolf. Tail straight; fur gray fawn-coloured, with a black stripe on the fore legs of the adult; eyes oblique. Body about $3\frac{1}{2}$ feet long. Inhabits the forests of Europe.—*Shaw*, i. pl. 75.

Var. A.—With the fur white. The hair of wolves turns white with age, and those in northern latitudes become white in winter.

However ferocious in its savage state, an instance related by M. F. Cuvier demonstrates that by education the wolf is susceptible of affection. A young wolf, brought up like a dog, became familiar with every person he was in the habit of seeing. He followed his master everywhere, seemed to suffer from his absence, was obedient to his voice, and differed in nothing from the tamest of domestic dogs. His master being obliged to travel made a present of him to the Royal Menagerie at Paris. Here he was shut up in a compartment, and remained for many weeks without exhibiting the least gaiety, and almost without eating. In time, however, he attached himself to his keepers, and seemed reconciled to his fate, when after an absence of eighteen months his master returned. At the first word he uttered the wolf, though it did not see him in the crowd, recognized his voice, and testified his joy by his motions and cries. Being set at liberty he overwhelmed his old master with caresses like the most attached dog. His master being obliged to quit him a second time, the same symptoms of regret appeared. Three years more elapsed, and the wolf was reconciled to his confinement and to the company of a young dog which had been given him for a companion. About this time, which would have obliterated in most dogs the remembrance of their master, the gentleman again returned. It was evening, and all was shut up. But the moment the creature heard his former master's voice, he indicated his recognition by the most impatient cries. The place being opened, the wolf rushed forward, placed his fore-feet on the shoulders of his earliest friend, licked every part of his face, and threatened with his teeth his keepers who approached, and to whom previously he had been testifying the warmest affection. A separation having again taken place the affectionate animal became in consequence sad and immoveable, refused sustenance, and his death was feared as the result. At the end of a week he was so reduced as was scarcely to be known. Time, however, again soothed his feelings, and his keepers gradually acquired his confidence.

C. Lycaon, Lin. Desm. The Black Wolf. Tail straight; body all black. Inhabits the mountainous parts of Europe and North America.—*Griffith's An. King.* ii. 348.

Var. A.—*Americana*. Black, with a white spot on the breast.

C. Javanicus, Desm. Fur of a brown fawn-colour, blackish on the back, feet, and tail; ears pretty small. Java.—*F. Cuv. Dict. Sc. Nat.* viii. p. 557.

C. jubatus, Desm. The Red Wolf. Fur of a cinnamon red; a short mane along the back of the spine. Body four feet four inches long. Paraguay.—*Cuv. Reg. An.* iv. pl. 1.

C. Mexicanus, Desm. Fur ash-coloured, variegated with yellowish spots, and black lateral stripes.—Inhabits South America.

C. pictus, Desm. (*Hyena picta*, Penn.) Fur variegated with large

spots of black, brown, and white. Size of the European wolf.
—Inhabits the South of Africa.

This species forms the type of a genus, according to Mr Brookes, under the name of *Lycæon*.

C. antarcticus, Shaw, Desm. Fur reddish; tail at base red, middle black, tip white. Falkland Islands.—*Penn. Quad.* t. 29.

C. cancrivorus, Desm. Fur ash-coloured, waved with black above, yellowish white underneath. Guiana.—*Buff. Sup.* vii. pl. 38.

C. aureus, Lin. The Chacal or Jackal. Yellowish gray above, whitish below; tail bristly, black at the extremity. Inhabits the warmer parts of the Old Continent.—*Buff. Sup.* vi. pl. 16.

C. corsac, Lin. Fur gray fawn-colour above, yellowish white beneath; tail very long, black at the tip. Inhabits deserts of Tartary.—*Buff. Sup.* iii. pl. 17.

C. mesomelas, Desm. The Cape Chacal. Fur fulvous brown, with a triangular blackish gray patch from the shoulders to the tail; tail touching the ground. Cape of Good Hope.—*Shaw*, i. pl. 79.

C. anthus, Desm. Fur gray, sprinkled with yellow spots; tail fawn-coloured, with a longitudinal black line at its base. Inhabits Senegal.—*F. Cuv. Mam.* xvii.

* * FOXES.—*Pupils of the eyes long; tail long and bushy.*

C. vulpes, Lin. The common Fox. Fur fawn-coloured above, white beneath; behind the ears black; tail bushy and terminated by black hairs. Inhabits the Northern parts of the Old and New Continent.—*Shaw*,

Var. A.—*C. alopec.* Fur thicker, and of a deeper red.

Var. B.—*C. crucigera.* With a black cruciform mark across the shoulders and down the spine.

The fox is one of the most widely distributed animals, and is found in all the temperate and northern regions of the old and new world. With one exception the structure of the eye, the organization of the fox and dog are similar. The pupil contracts in a strong light, and assumes a circular form only during twilight or at night. Hence the fox preys by night; and notwithstanding the persecution he undergoes, the extreme cunning of the fox, which has become proverbial, enables him to preserve his race where other animals would have been extirpated. The fox passes the day in his hiding-place, and sallies forth at night along the fields to surprise the partridge on her nest, or the hare in her form. He lies in ambush near the burrows of rabbits, and when game of this description fails, he approaches the farmyards and carries off the poultry, or feeds on the refuse of the kitchen. Distrustful to excess, he is not to be deceived by the snares which may be laid for him; and the severest hunger will not prompt him to approach a bait which may lead him into a snare. Gestation continues from sixty to sixty-four days; at three or four months the young foxes quit their burrow; and at two years their growth is completed.

C. lagopus, Lin. The Arctic Fox. Fur very long, thick and soft, uniformly ash-coloured or brown in summer, white in winter. Inhabits the Arctic Regions.—*Bewick, Quad.*

C. argentatus, Desm. Silvery Fox. Fur soot black, spotted or shaded with white; extremity of the tail white. Inhabits North America and Asia.—*F. Cuv. Mam.* v.

- C. decussatus*, Geoff. Fur variegated with black and white above, with a black cross on the shoulders.—Inhabits North America.
- C. Virginianus*, Gmel. Gray Fox. Body entirely silvery gray, with a shade of red about the ears. North America.—*Catesby*, ii. t. 78.
- C. fulvus*, Desm. Fur reddish or fulvous; breast gray; face of the fore-legs and feet black, with fulvous toes; tip of the tail white. United States.—*Mam.* p. 203.
- C. velox*, Say. Fur fulvous; head above ferruginous. About one-half the size of the preceding.—*Long's Exped.* i. p. 486.
- C. cinereo-argenteus*, Lin. Upper part of the body grayish black; ears and sides of the neck bright red; throat and cheeks white; tail yellow, mixed with black. N. America.—*Schreb.* tab. 92, A.
- C. Niloticus*, Geoff. Body reddish above, gray below, behind the ears black; legs fulvous. Inhabits Egypt.—*Desm. Mam.* 204.
- C. megalotis*, Cuv. Fur gray; ears very large, broad and long; a line of longer blackish hairs on the spine; feet black. Cape of Good Hope.—*Griff.* ii. 374.
- C. Brucei*, (*Fennecus Brucei*, Desm.) Bruce's Fennec. Fur dirty white, belly lighter; ears thin, margined with white hairs. Inhabits Abyssinia.—*Shaw*, i. pl. 80.—M. Desmarest makes a genus of this species under the name of *Fennecus*.

Gen. 74. VIVERRA, Lin. Cuv. Geoff. Desm.

Incisors $\frac{6}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 40$. Three false molars in the upper jaw, conical and compressed, a large carnivorous bicuspid tooth, and two tuberculous ones; in the lower, four false molars, one bicuspid and one tuberculous; head long; muzzle pointed; feet pentadactyle; claws semiretractile; anal pouch more or less deep.

Sub-Gen. 1. CIVETTES, *proper*. Anal pouch very deep, divided into two sacs, filled with a musky secretion.

V. civetta, Lin. The Civet. Fur gray, with brown or black stripes and spots; a mane along the dorsal line. Inhabits Africa.—*Shaw*, i. pl. 95.

The odoriferous substance produced by the Civet forms in the east an object of commerce. This substance is secreted in a bag or pouch between the anus and parts of generation, and is similar in both sexes. It opens externally by a narrow cleft, which conducts into two cavities, each of which might contain an almond. The internal surface of these bags is slightly covered with hair and porous, and the musk is exuded from these pores into the bag. When the bag is nearly full the animal has the power of compressing it so as to extrude the superfluous part of the secretion.

V. zibetha, Lin. The Zibet. Fur gray; legs transversely spotted with brown; throat white, with two black bands on each side; no mane; tail annulated with black. India.—*Shaw*, i. pl. 95.

V. rasse, Horsf. Fur yellowish gray; neck obscurely banded with black lines; feet brown. Inhabits Java.—*Horsf. Java*, vi.

Sub.-Gen. 2. *Anal pouches reduced to a simple fold of the skin.*

V. genetta, Lin. Fur gray, with small round and elongated black spots; tail annulated with black. Inhabits South of Europe.—*Shaw*, i. pl. 96.

It is probable, from the different synonyms applied to this animal, and the very different parts of the world where it is found, that the individuals described are more than simple varieties, though Baron Cuvier is inclined to consider them as such.

V. fossa, Lin. Fur reddish gray, with yellowish brown spots, and four longitudinal lines on the back. Madagascar.—*Shaw*, i. pl. 96.

V. fasciata, Desm. Fur yellow brown, with brown spots disposed longitudinally.—*Shaw*, i. pl. 97.

V. musanga, Raffles. The Musang. Fur variegated with ash-colour and black; back with faint black bands; head, feet, and tail black; point of the muzzle white. Sumatra.—*Lin. Trans.* xiii. 253.

V. Indica, Geoff. Desm. Fur yellowish white, with eight narrow longitudinal brown bands. India.—*Shaw*, i. pl. 96.

V. gracilis, Desm. (*Prionodon gracilis*, Horsf.) Fur clear fawn-coloured, with four broad brown transverse bands; tail annulated with black; head elongated; muzzle pointed. Inhabits Java.—*Horsf. Zool. Res.* fas. i.

V. striata, Desm. (*Viv. fasciata*, Lin.) Fur marked with six brown bands, pretty broad, upon a yellowish bottom. Coromandel.—*Buff. Supp.* vii. pl. 57.

V. Bondar, Blainv. Fur yellowish, hairs tipped with black; dorsal line, and two narrow parallel lines on each flank black. Bengal. *Desm. Mam.* p. 210.

V. hyenoides, Cuv. (*Proteles Lalandii*, Isid. Geoff.) General aspect of the hyena. Fur gray; small mane; narrow transverse black bands on the flanks, thighs and legs, Cape of Good Hope.—*Mem. Mus.* ii. 5.

Sub-Gen. 3. PARADOXURUS, F. Cuv.—*No anal pouch, plantigrade, claws half retractile, tail convolute.*

V. nigra, (*Paradoxurus typus*, F. Cuv.—*V. musanga*, Raffles.) Body blackish; a white spot above and below the eyes; tail black. India.—*Griff.* ii. 412.

V. albifrons, (*Par. albifrons*, F. Cuv.) The Bintourong, Raffles. Fur formed of a mixture of long white and black bristles, except the head and limbs, where it is short; forehead and muzzle nearly white; a black spot inclosing the eye. India.—*Lin. Trans.* xiii.

V. aurea, (*Par. aureus*, F. Cuv.) Fur uniform golden yellow, hair very long.—*Griff. Syn.* 159.

V. prchensilis, Blainv. (*Par. prehensilis*, F. Cuv.) Fur yellowish green, with dorsal line, tip of the tail and spots black.—Bengal.

Gen. 75. HERPESTES, Illig.—*Viverra* and *Mustela*, Lin.—*Ichneumon*, Lacep.

Incisors $\frac{6}{3}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{3}$ — $\frac{5}{3}$ = 36. Body elongated;

anal pouch large ; feet pentadactyle, semipalmated, with nails partly retractile.

II. *Mungos*, Desm. (*Viv. Mongoz*, Lin.) Indian Ichneumon. Fur marked on the back with 12 or 13 brown transverse bands, separated by as many reddish bands ; tail pointed. India.—*Buff.* xiii. pl. 19.

H. *Edwardsii*, Desm. Back and tail olive, annulated with brown ; muzzle reddish brown ; tail pointed. Inhabits India.—*Edwards' Birds*, t. 199.

H. *griscus*, Desm. (*Viv. Cafra*, Lin.) Fur brownish gray and uniformly speckled with reddish brown from the annulations of the hair ; tail pointed. Southern Africa.—*Buff. Sup.* iii. pl. 27.

H. *galera*, Desm. (*Mustela galera*, Lin.) Guinea Weasel, Penn. Fur deepish brown, speckled with yellow ; fur of the tail of equal thickness its whole length. Madagascar.—*Penn. Quad.* ii. 53.

H. *Javanicus*, Geoff. Fur chestnut brown, spotted with yellow white ; head and legs chestnut. Java.—*Desm. Mam.* 212.

H. *ruber*, Geoff. Fur very bright ferruginous red, especially on the head.—*Geoff. Hist. Nat.* ii. 139.

H. *major*, Desm. (*Ichneumon major*, Geoff.) Large Ichneumon. Fur chestnut brown ; hair annulated with yellow ; tail brown, pointed.—*Buff. Supp.* iii. pl. 26.

H. *Pharaonis*, Desm. (*Viv. ichneumon*, Lin.) The Ichneumon. Fur of chestnut and fawn colour, each hair being annulated alternately with these tints ; feet and muzzle black ; tail long, tufted. Inhabits Egypt.—*Shaw*, i. pl. 92.

The Ichneumon was well known to the ancients, and was venerated in Egypt for its destruction of the reptile species, and particularly of the eggs of the crocodile. In Egypt it is often seen at the close of the day gliding through the ridges or inequalities of the ground in search of its prey. It never limits itself to the momentary gratification of its appetite, but destroys every living thing within its reach, which is too feeble to offer effectual resistance. In domestication it acquires an attachment to the houses into which it is introduced, never wanders, recognizes the voice of its master, and is pleased with the caresses bestowed on it.

Gen. 76. SURICATA, Desm.—*Viverra*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 40$. Body elongated ; feet tetradactyle, with strong nails for digging ; ears small ; pouch around the anus ; tail long and slender.

S. *Capensis*, Desm. (*Viv. tetradactyla*, Lin.) Hairs annulated with brown, white, yellowish, and black. About a foot long. Cape of Good Hope.—*Shaw*, i. pl. 93.

3d Division.—*Without a tuberculous tooth behind the great carnivorous tooth in the lower jaw.*

Gen. 77. HYÆNA, Cuv. Briss. Geoff.—*Canis*, Lin. Erxleb.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{4}-\frac{5}{4} = 34$. Feet tetradactyle ; nails not retractile ; legs long ; eyes projecting ; ears large ; a glandular pouch at the anus.

H. vulgaris, Desm. (*Canis hyæna*, Lin.) The striped Hyæna. Fur dirty gray, striped transversely with brown on the flanks and legs; a ridge of stiff hairs along the dorsal line. Inhabits Barbary, Egypt, &c.—*Shaw*, i. pl. 78.

The voracity of this animal, and its preference of the flesh of dead carcasses to living prey, have been often noticed by travellers. But its ferocity has been overrated, for it is capable of being tamed; and according to Barrow the spotted hyæna is used in the district of Schneeberg at the Cape of Good Hope for the purposes of hunting. In some countries it is by no means uncommon to see chacals, hyænas, dogs, and vultures feeding on the same carcase.

H. Capensis, Desm. (*Canis crocuta*, Lin.) Spotted Hyæna. Fur dingy gray, with round brown spots on the flanks and thighs; stiff hair on the dorsal line. Inhabits Cape of Good Hope.—*Penn. Quad.* pl. 17.

H. rufa, Cuv. Fur red, spotted with blackish.—Country unknown.

H. fossilis, Cuv. The Fossil Hyæna. About a third larger than the common hyæna. Bones found in various caverns in Europe. *B.—Cuv. Rech.* iv. part. 4, pl. 1.

Gen. 78. FELIS, Lin. Cuv. Geoff. &c.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{4}{5}-\frac{4}{5}$, or $\frac{5}{5}-\frac{5}{5}$, = 30 or 28.

Five toes on the fore-feet; hind-feet tetradactyle; nails retractile; head short; four molars on each side of the upper jaw, the last tuberculous and very small; three in the lower jaw; ears large pointed.

1. Fawn-coloured, and without spots.

F. Leo, Lin. The Lion. Fur fawn-coloured, with a tuft at the extremity of the tail; neck of the male furnished with a long thick mane. Body from five to eight feet long. Inhabits Africa and some parts of Asia.

Var. A.—The Senegal lion. Fur lighter and brighter.

Var. B.—South African lion. With a black mane.

Var. C.—Asiatic lion. Rather less than the lion of Africa; mane yellow, and much more scanty.

The bodily strength of the lion, his carnivorous regimen, and predaceous habits, place him at the head of the beasts of prey. Less savage than the tiger and other carnivorous animals, the lion seems to derive no gratification from the destruction of animal life beyond the immediate cravings of appetite; and hence, compared with the cruel dispositions of many of the minor inhabitants of the forest, he has acquired a character of generosity superadded to his courage, which has long made him be regarded as the noblest of the feline race. Unlike the tiger, whose social attachment lasts only during the period of reproduction, and whose thirst for blood often leads him to destroy his own issue, the lion is permanently attached to his mate; while the maternal feeling of the lioness is strikingly displayed in the subsequent fury of this noble animal when by any accident she is “bereaved of her whelps.”

The roar of the lion is said to be tremendous, and travellers in Africa have often witnessed its appalling effect on the oxen of their waggons and other animals, though in comparative safety. When in the act of seizing his prey, this roar is heightened into a scream on the fatal leap. This power of voice is said to be useful to the lion, as the terrific sound raises the other animals from their hiding-places, and, as he does not hunt by scent, exposes their distracted flight to their enemy. The mode of his attack is generally, however, by surprise. Approaching slowly and silently till within a leap of his prey, the lion springs with a force which is thought

in general to deprive its victim of life. The muscular strength of the lion is such, that he is capable of carrying off a horse or a buffalo; and by the power of his limbs alone he is said to be able to break the spine of a horse.

In confinement the lion shows unequivocal marks of gratitude and affection to the person who serves him with food. The instance mentioned by Seneca, and of which he was personally a witness, of a lion recognizing its former keeper in the Amphitheatre at Rome, where he was exposed for destruction, and protecting him, is well known; and instances are not wanting of their attachment to other animals. To the well-known case of a lion in the Tower of London, which refused all sustenance and died, on the occasion of the death of a little dog which had long shared his den, many others might be added; and Mr Griffith states on the authority of Major Smith, that that gentleman "had met with eleven instances of different lions which have protected and fostered dogs, and but a single one of the tiger exhibiting a similar kindness of disposition." The exhibition of a young lion and a lamb in one inclosure of a travelling menagerie, may be mentioned as a proof how far early education can overcome the carnivorous propensity in an animal not cruel beyond the imperious necessity of supplying itself with food.

The lion is now found chiefly in Africa; in Asia, excepting some districts between India and Persia, and some parts of Arabia, they are rare. The Asiatic variety is of a uniform yellow colour, and the mane, more scanty than in the African species, is also yellow. The progress of population, and the destruction of game, has diminished the number of species, or extirpated them entirely in countries where they formerly abounded, and few are now seen in Europe in comparison to the numbers which were exhibited in the Roman Circus. Scylla caused one hundred, all males, to be turned out for the amusement of the Roman people; Pompey six hundred, of which one hundred and fifteen were males; and Cæsar four hundred. The numbers seem not to have been much reduced under the first Emperors. Adrian often exhibited one hundred in the Circus; Antonine on one occasion one hundred, and Marcus Aurelius a like number; Gordian the third had seventy which were trained; and Probus had one hundred of both sexes.

The period of gestation in the lioness is about one hundred and eight days. They are brought forth with the eyes open; but the ear does not become completely erect for two months. They arrive at maturity in five years, and are then nearly eight feet long. When young, the lion has no trace of the mane or of the tuft at the end of the tail. A male lion and tigress confined in one compartment, in the menagerie of Mr Atkins, has twice produced cubs, of which excellent figures are given in Griffith's *Animal Kingdom*, ii. 447.

F. concolor, Lin. The Puma or American Lion. Fur fawn-coloured; without mane or tuft at the end of the tail. About $3\frac{1}{2}$ feet long. Inhabits the warm and temperate parts of America.—*Wilson's Illustrations of Zoology*, No. i. pl. 1.

2. *Large, with transverse bands of a darker colour.*

F. tigris, Lin. The Tiger. Fur clear fawn-colour above, white below, striped on the body with irregular narrow black bands; hairs about the cheeks very long. Body about five feet long. Inhabits Bengal, &c.—*Griff.* i. 440.

Var. A. white, with the stripes of a more opaque white.—*Griff. An. King.* ii. 444.

This animal is the scourge of Asia and the Indian islands. Ferocious in a very high degree, its speed and strength is such as to enable it to seize a man on horseback, and drag or rather carry him in its mouth by bounds or leaps to the nearest jungle or forest. The tiger, unlike the lion, does not confine itself to killing single prey, but attacks, with a cruel avidity for blood, all within its reach. In confinement, however, when taken young, it grows familiar, and exhibits affection and gentleness to its keeper.

3. *Large, fawn-coloured, with brown or black round spots.*

F. onca, Desm. Gmel. The Jaguar. Fur fawn-coloured above, whitish beneath: body marked with open circles of black, containing

a central spot, the circles disposed in five or six parallel horizontal lines. Inhabits America.—*Shaw*, i. pl. 84.

Var. A. *Felis nigra*, Gmel. Fur blackish, with the spots deeper black.

The Jaguars are solitary animals, or are met with only in pairs. They inhabit thick forests in the neighbourhood of great rivers, and if driven by their wants to seek for food in the cultivated country they generally do so by night. They will attack cows and even bulls of four years old; but horses seem their favourite prey. During the residence of D'Azara in Paraguay no less than six men were destroyed by this formidable animal, two of whom were at the time before a large fire.

F. nebulosa, Griff. (*F. microclis*, Horsf.) The Clouded Tiger. Head small; body long, heavy; tail thick and annulated; body covered with large irregular patches, deeper than the ground colour. Inhabits Sumatra.—*Griff. An. King.* p. 450.

F. pardus, Lin. The Panther. Fur pale fawn-colour above, with six or seven rows of rose-formed spots, forming on the flanks clusters of five or six spots. Inhabits Northern Africa.—*Shaw*, ii. pl. 84.

F. leopardus, Desm. The Leopard. Fur fawn-coloured above, white beneath, with at least ten rows of rose-formed black spots on each flank. Inhabits Africa.—*Shaw*, i. pl. 85.

F. jubata, Lin. The Hunting Leopard. Fur fawn-coloured, covered with small black round spots, not running into one another; a slight mane. Inhabits Asia.—*Shaw*, i. pl. 86.

The Hunting Leopard, it is said, is conveyed in a carriage, or on a pad behind the saddle of a horseman, with a hood over the eyes, to the field, and when an antelope is started the hood is taken off, and it is dispatched in pursuit. It follows by leaps or bounds, and if unsuccessful in taking its prey after a few efforts, declines the pursuit and returns to its keeper. A tame specimen described by M. F. Cuvier was accustomed to go at large in a park, and associated with children and domestic animals, purring like a cat when pleased, and mewling when he wished to call attention to his wants.

F. venatica, Griff. Brighter yellow than the last; no mane. Inhabits India.—*Griff. Syn.* 166.

F. uncia, Gm. The Ounce. Body whitish, covered with irregular black spots. Inhabits Persia.—*Griff. An. King.* ii. 469.

F. chalybeata, Griff. Fur wholly grayish liver colour, with numerous dark brown simple spots. Inhabits Chili.—*Griff.* ii. 473.

4. Middle-sized, with stripes and spots.

F. mitis, Desm. (*F. chati*, F. Cuv.) The Chibigouazou. Fur with a fawn-coloured ground, with four rows of black dorsal spots; spots on the flanks small, bordered. Inhabits S. America.—*Penn. Quad.* pl. 31, fig. i.

Var. A.—Spots more numerous and smaller, with a large one on each cheek.

Var. B.—Parallel streak from the eye to the ear, with spots within it; tail annulated.

Var. C.—(*F. catenata*, Griff.) Body with long chain-like markings; belly and throat with black streaks.

F. pardalis, Lin. The Ocelot. Ground colour of the fur gray, with large fawn-coloured spots bordered with black, forming oblique bands on the flank. South America.—*Shaw*, i. pl. 88.

F. macrourus, Major Smith. Ground colour ochrey gray, streaked with long patches; two streaks from the eye to the jaw. Inhabits Brazil.—*Griff. An. King.* ii. 478.

F. colocolo, Major Smith. Head flat and broad; body whitish gray, covered with lengthened streaks of black and tawny. Inhabits America.—*Griff. An. King.* ii. 479.

F. melas, Peron and Lesueur. (*Melas*, Cuv.) Fur black above and below, spotted with deeper black; eyes of a silvery gray, almost white. Java.—*Ann. Mus.* xiii. 152.

5. *Middle-sized, high on the legs, with broad and long ears, often terminated by a pencil of hairs; three upper molars without tubercles.*

F. Lynx, Lin. The Lynx. Fur reddish yellow, with small dark brown spots; tail short, black at the extremity; long pencilled ears. Asia, Africa, and Europe.—*Buff.* ix. pl. 21.

F. Canadensis, Geoff. The Canada Lynx. Fur grayish, with long hair; some black lines on the head. Canada.—*Buff.* iii. pl. 44.

F. rufa, Gmel. The Red Lynx. Fur reddish yellow, spotted with brown; tail short, white at tip. United States.—*Schreb.* t. 109, B.

F. fasciata, Desm. (*Lynx fasciatus*, Rafinesque.) Fur reddish brown, with blackish stripes and spots above.—N. America.

F. montana, Desm. (*Lynx montanus*, Rafinesque.) Fur grayish, without spots above, whitish with brown spots below; no pencils on the ears. United States.—*Mam.* 225.

F. Floridanus, Desm. (*Lynx Floridanus*, Rafinesque.) Fur grayish, flanks varied with spots of yellowish brown, and undulated black stripes; ears without pencils of hair. Florida.—*Mam.* 225.

F. aurea, Desm. (*Lynx aureus*, Rafinesque.) Fur bright yellow, dotted with black and white spots; belly of a pale yellow without spot. Ears without pencils of hair. N. America.—*Mam.* 225.

F. caracal, Lin. The Caracal; The Lynx of the ancients. Fur wine-red above, white below; tail reaching to the heels; ears strongly pencilled, black on the outside, white within. Inhabits Africa and Asia.—*Shaw*, i. pl. 91.

There are several varieties of this species, of which the chief are, 1. The Caracal of Algiers, described by Bruce, without pencils of hair at the ears, and with longitudinal stripes. 2. The Caracal of Nubia, of the same author, with the ears black on the outside; and 3. The Caracal of Bengal, of Edwards, with the tail longer than ordinary.

F. chaus, Guldenstadt, Desm. (*Felis Lybicus*, Oliv.) The Booted Lynx. Fur of a uniform gray yellow; hind part of the legs black; ears terminated by a pencil of black hairs. Inhabits Abyssinia.—*Bruce's Travels*, pl. 30.

6. *Ears without pencils of hair, legs not very long—of small size.*

F. Serval, Lin. Fur fawn-coloured above, white beneath, with numerous round black spots disposed in rows on each side; tail annulated. Inhabits Southern Africa.—*Schreb.* tab. 108.

- F. galeopardus*, Desm. (*Serval*, Cuv.) Fur fulvous above, whitish beneath, with black spots, of which those on the middle of the back are in four rows; tail annulated.—*F. Cuv. Mam.* liv. 1.
- F. Capensis*, Forster, Desm. Fulvous, with black spots of different sizes, and bands on the shoulders, back, and fore-legs; tail annulated; ears large, without pencils of hair. Cape of Good Hope.—*Penn. Quad.* i. pl. 1.
- F. Cafra*, Desm. Fur gray fawn-coloured above, lighter beneath; twenty brown transverse stripes upon each flank; feet banded with black.—Cape of Good Hope.
- F. manul*, Pallas, Gmel. Fur of a reddish uniform fawn-colour, with two black spots on the top of the head, and two stripes on the cheeks.—Inhabits Tartary.
- F. Javanensis*, Cuv. Desm. Fur gray-brown above, whitish beneath; four rows of elongated spots along the sides. Inhabits Java.—*Horsfield's Java*, No. 1.

The *F. Bengalensis* of Desmarest appears to be a variety of this species.

- F. undata*, Desm. Fur of a dirty gray, with numerous transverse brown or black bands; convexity of the ears reddish. Java, &c.—*Vosmaer, Monog.* t. 13.

Var. A.—Spots much more irregular.—*F. Sumatrana*, Horsfield.

- F. obscura*, Fred. Cuv. Fur of a very deep brown black, with transverse numerous stripes, entirely black.—Cape of Good Hope.
- F. yagouaroundi*, Desm. Fur black brown, spotted with pale white. Inhabits S. America.—*Azara, Voy.* pl. 10.
- F. Mexicana*, Desm. Fur of a uniform bluish-gray, spotted with black. S. America.—*Buff. Sup.* iii. pl. 43.
- F. pajeros*, Desm. Fur bright gray brown above, with reddish transverse bands on the throat and belly, and faint annulations on the feet.—Inhabits S. America.
- F. eyra*, Desm. Fur bright red, a white spot on each side of the nose; tail more bushy than the domestic cat.—Paraguay.
- F. tigrina*, Lin. Fur fawn-coloured above, whitish beneath; with five rows of longitudinal spots on the back, and oblique upon the flanks; tail irregularly annulated. Brazil.—*Schreb.* t. 106.
- F. catus*, Lin. The Domestic Cat. Ground colour of the fur of a gray more or less marked; with blackish longitudinal bands upon the back and transverse ones upon the flanks; lips and soles of the feet black; tail annulated, with the tip black.

The wild variety has long and tufted hair, particularly on the cheeks; upper part of the body of a deep yellowish gray or brown, the under parts whitish; the back marked with a longitudinal black line, from which arise numerous indistinct transverse lines, extending parallel to one another to the flanks, the shoulders, and the thighs; similar smaller lines on the face and top of the head, and one across the cheeks from the external angle of the eyes; tail bushy, annulated with black, and with its tip of the same colour; ears stiff and erect; and the pupils of the eyes contracting longitudinally. The wild cat lives in woods isolated or in pairs; climbs trees with facility, and

preys on birds, levcrcets, rats, and other small quadrupeds. Numerous varieties occur in domestication, distinguished by the arrangement of the colours, spots, or stripes. The most remarkable are those totally white or completely black; but the varieties most valued are those where the stripes are well-marked, hence called the tiger cat, and the spotted cat of Spain. The fur of this last is short and brilliant; the feet and lips flesh-coloured; and the fur spotted with irregular patches of pure white, lively red, and deep black. Desmarest, however, has remarked in a number of instances that the females of this race are alone spotted with the three colours.

FAMILY III.—AMPHIBIA.

Feet short, enveloped in the skin, in form of fins; the posterior in the direction of the body; number of incisors variable; often six and sometimes four above, more generally four; and sometimes two below.

Gen. 79. PHOCA, Lin. Cuv. Geoff.—*Otaria*, Peron.

Incisors $\frac{6}{4}$ or $\frac{6}{2}$ or $\frac{4}{4}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{5}{5}$ — $\frac{5}{5}$ or $\frac{6}{5}$ — $\frac{6}{5}$ or $\frac{6}{6}$ — $\frac{6}{6}$, = 30, 32, 34, 36, to 38. Molars all cutting or conical; five toes on all the feet; tail short; eyes large; nostrils closing at the will of the animal; head round; external ears wanting; four abdominal mammae.

In arranging the seals as a family of his *Carnassiers*, Cuvier seems to have been led by the structure of their teeth rather than their general form and habits, which seem to connect them with the Cetacea. The structure of the seal is admirably adapted to its aquatic life. The nostrils are habitually closed, and the ears are shut when the animal dives. All its movements on land are slow and painful. In walking, or rather crawling, it presses the fore and hind parts of the body alternately on the ground, bending its back upwards. The claws of the anterior extremities assist it in climbing, but the hind feet are only used in swimming. Seals are easily tamed; and one of the individuals of the species *P. vitulina*, preserved alive in the Menagerie at Paris, lived familiarly with two young dogs which were shut up with him; and when they leaped upon his back, barked and run from him, used to share in their amusement, trailing himself with painful effort along the stones and mud to approach them. In cold weather the dogs and seal lay closely together to keep each other warm.

Seals bring forth annually one or two young, which they suckle on land with much apparent tenderness. They live in numerous flocks, and in the coupling season furious battles are fought by the males for the possession of the females. They inhabit every sea, but chiefly those of the polar regions, and are killed in numbers for their skins and oil. The appearance of the seal on a desolate rock suckling its young has perhaps given rise to the fable of the Mermaid.

Sub-Gen. 1.—PHOCA, Peron. *No external ears; incisors with a simple edge; molars edged; toes of the hind feet terminated by pointed nails, placed on the border of the membrane.*

* *Head furnished with cutaneous appendages, or a kind of trunk.*

P. proboscidea, Peron. The Sea Elephant. Hair very thinly scattered, gray; claws of the fore-feet small; occipital and sagittal ridges very prominent; incisors $\frac{4}{2}$. Twenty to thirty feet in length. Seas of New Holland.—*F. Cuv. Mem. Mus. vi. t. 3, fig. 1.*

P. Ansonii, Desm. (*Phoca leonina*, Lin.) Hair short, clear yellow; feet and tail black; claws of the fore-feet strong; incisors $\frac{6}{2}$. From 12 to 20 feet long. Pacific Ocean.—*Schreb. tab. 83, A.*

- P. Byronii*, Blainville. The occipital and sagittal ridges and the mastoid apophyses very prominent; incisors $\frac{6}{2}$, the upper ones next the canines larger than the others.—Island of Tinian.
- P. cristata*, Desm. (*Phoca leonina*, Fab.) The Crested Sea Lion. Top of the forehead furnished with a moveable hood, susceptible of erection, and of covering the eyes and muzzle; incisors $\frac{4}{1}$. Seven or eight feet long. Northern Seas.—*Shaw*, i. pl. 73.

** *Species without trunk or hood.*

- P. albiventer*, F. Cuv. (*P. leptonyx*, Desm. *P. bicolor*, Shaw.) Fur above gray, variegated with yellow; yellowish white beneath; whiskers rigid; claws, especially those of the hind feet, small.—*Shaw*, i. pl. 71.
- P. Grænlantica*, Muller, (*P. oceanica*, Cuv.) The Greenland Seal. Fur of the adult males whitish, marked with a large brown spot on the shoulders; claws strong, black; females and young covered with unequal, distant, angular spots. Inhabits the North Sea.—*Shaw*, i. pl. 71.
- P. leporina*, Desm. Fur yellowish; head and body covered with long and soft white hairs; claws of the fore-feet very strong. Inhabits the Northern Ocean.—*Mam.* 243.
- P. lagura*, Cuv. Fur gray, clearer on the sides and belly; whiskers black; tail long, thin, white.—*Oss. Foss.* v. 206.
- P. vitulina*, Lin. The Common Seal. Fur yellowish gray, thick, more or less waved or spotted with brown, according to the age; incisors $\frac{6}{4}$; claws strong. North Seas. *Shaw*, i. pl. 70.—There are numerous varieties of colour in this species.
- P. fœtida*, Mull. Fur of a pale brown, variegated with white above, dirty white beneath; hair rough; claws strong; incisors $\frac{6}{4}$. Inhabits the North Seas.—*Buff.* *Sup.* vi. pl. 45.
- P. barbata*, Mull. The Bearded Seal. Fur blackish; thumb of the hand shorter than the fingers; incisors $\frac{6}{4}$. Inhabits the North Seas.—*Buff.* vi. pl. 45.
- Sub.-Gen. 2.—OTARIA, Peron. Incisors $\frac{6}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, large; molars $\frac{6}{5}-\frac{6}{5}$, root simple, and a prominent conical point; external ears distinct.
- P. jubata*, (*Otaria jubata*, Desm.) Sea Lion. Fur yellow; neck of the male with a large mane; hind feet with the termination lobed. Inhabits the Pacific Ocean.—*Shaw*, ii. pl. 174.
- P. ursina*, Lin. (*Otaria ursina*, Desm.) Common Sea Bear. Fur brown; males maneless; the hind-feet furnished with long flaps of skin. Kamtschatka. This is the type of M. F. Cuvier's genus *Arctocephalus*.—*Buff.* *Sup.* vi. pl. 47.
- P. Peronii*. (*Otaria Peronii*, Desm.) Fur soft, blackish; the hind feet having only three claws apparent in the middle, ending in a five lobed membrane. Cape of Good Hope.—*Buff.* xiii. t. 53.

- P. coronata*, Blain. (*Otaria coronata*, Desm.) Fur black, with yellow spots ; a yellow band on the head and a spot on the muzzle ; hind feet with five claws.
- P. cinerea*. (*Otaria cinerea*, Peron, Desm.) Fur ash-coloured, thick and rigid. Coast of New Holland.
- P. albicollis*. (*Otaria albicollis*, Peron, Desm.) Fur with a large white spot on the top of the back.—New Holland.
- P. flavescens*, Shaw. (*Otaria flavescens*, Desm.) Fur of a pale yellow ; no nails apparent on the fore-feet ; the hind feet with claws. Straits of Magellan.—*Shaw* i. pl. 73.
- P. Falklandica*, Shaw. (*Otaria Falklandica*, Desm.) Fur ash-coloured, shaded with white ; fore-feet clawless ; hind feet with four claws.—Inhabits Falkland Islands.

Gen. 80. TRICHECUS, Lin. Cuv. Desm.

Incisors $\frac{2}{0}$, canines $\frac{1}{0}-\frac{1}{0}$, molars $\frac{5}{3}-\frac{5}{3} = 24$. Incisors small, deciduous ; superior canines or tusks of large size, longer than the head, compressed laterally and arched ; molars cylindrical, crown truncated obliquely ; body elongated ; head round ; muzzle large ; no external ears ; tail very short ; fore-feet like fins, with five toes ; hind feet horizontal ; toes enveloped in the skin.

T. rosmarus, Gmel. (*T. manatus*, Lin.) The Morse. Lips very thick ; bristles rigid ; hair very thin, short, reddish ; two enormous canines projecting downwards. Northern Ocean.—*Shaw*, i. pl. 78.

The Morses or Walruses are animals of very large size, sometimes eighteen feet long, and closely resemble the *Phoca* in their mode of life. They inhabit similar places, and are generally found together. They are gregarious animals, and are sometimes seen in vast multitudes on masses of floating ice in the Northern Seas. "They lie," says Captain Cook, "in herds of many hundreds upon the ice, huddling one over the other like swine, and roar or bay very loud, so that in the night, or in foggy weather, they gave us notice of the ice before we could see it. We never found the whole herd asleep, some being always on the watch. These, on the approach of the boat, would wake those next to them, and the alarm being gradually communicated, the whole herd would be awake presently. But they were seldom in a hurry to get away till after they had been once fired at. Then they would tumble one over the other into the sea in the utmost confusion."—"The female will defend her young to the very last, and at the expence of her own life, whether upon the water or upon the ice. Nor will the young one quit the dam though she be dead, so that if you kill one, you are sure of the other. The dam when in the water holds the young one between her fore-fins." These animals are killed for the sake of their oil.

ORDER V.—MARSUPIALIA.

Teeth different in the different genera. Young brought forth prematurely, often in a pouch formed by a fold of the skin of the abdomen of the females, inclosing the mammæ ; marsupial bones in both sexes ; thumb of the hind feet sometimes

wanting, sometimes very distinct, without nail, opposable to the other toes ; scrotum of the males before the organ of generation.

The general character of this Order is the marsupial pouch in the abdomen of the female, in which the imperfect germs of the young are deposited till their further development. In this pouch the mammae also are placed. Linnaeus arranged all the species which he knew under one genus, *Didelphis*, and their general resemblance afforded sufficient grounds for this arrangement. But on the discovery and examination of new species from Australasia, it was found that no common character could be formed from their teeth, feet, and organs of digestion, and that the differences in structure of these made it impossible to include them in any of the existing Orders. The presence of the abdominal pouch, therefore, and marsupial bones in both sexes, separating them from all the other quadrupeds, Cuvier arranged these singular animals in a separate family of his *Carnassiers*, but suggested their forming the type of a larger division ; and we have accordingly followed Latreille in arranging the species as a separate Order.

Gen. 81. DIDELPHIS, Lin. Cuv. Geoff. Desm.

Incisors $\frac{1}{8}^0$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7}$, or $\frac{6}{7}-\frac{6}{7}$, = 50 or 48. Two superior intermediate incisors larger than the others ; lower incisors equal ; canines strong, compressed ; molars, the three first in the upper jaw triangular ; the others crowned with points ; head long and conical, muzzle pointed, mouth much cleft ; ears large, rounded, almost naked ; five toes on all the feet, nails long and bent ; hind feet plantigrade, with the thumbs opposable, but destitute of nails ; tail long, scaly, mostly deprived of hair.

* *Females with an abdominal pouch.*

- D. *Virginiana*, Desm. Gmel. Virginian Opossum, Shaw. Fur woolly, fine, mixed black and white, with white lines ; head nearly white ; size of a rabbit. America.—*Shaw*, i. pl. 107.
- D. *Azarae*, Tem. Fur of two sorts, one cottony underneath, and black at the tip ; the other rigid and white ; black round the eyes ; the legs black ; half of the tail hairy, the rest scaly. South America.—*Tem. Monog. Mam.* p. 30.
- D. *cancrivora*, Lin. Desm. The Crab-eating Opossum. Fur yellowish, mixed with brown ; forehead brown. Surinam.—*Buff. Sup.* vi. pl. 54.
- D. *Quica*, Tem. Fur above blackish yellow ; upper part of the head blackish, with three white bands ; chin white ; belly reddish. Size of a polecat. Brazil.—*Tem. Mam.* p. 36.
- D. *Opossum*, Lin. Fur fawn-coloured above, whitish below ; a pale white spot above each eye ; tail partly hairy. S. America.—*Shaw*, i. pl. 108.
- D. *Philander*, Schreb. Fur spotted with brown ; head very short, muzzle blunt ; head with a red central longitudinal band ; eyes placed in a gray spot ; tail naked.—*Schreb.* vii. t. 147.

** *Females without a pouch.*

- D. nudicaudata*, Geoff. Desm. Fur gray, brown above, whitish underneath ; a pale yellow spot over each eye ; tail longer than the body, naked.—Inhabits Cayenne.
- D. crassicaudata*, Desm. Fur fawn or cinnamon-coloured, brighter over the eyes ; tail thick at its origin, covered for a third of its length.—Paraguay.
- D. cayopollin*, Lin. Desm. Mexican Opossum. Fur yellowish gray above, whitish underneath, round the eyes and upon the nose ; tail brown, spotted with blackish, much longer than the body. Mexico.—*Buff.* x. pl. 55.
- D. lanigera*, Desm. Fur woolly, almost the colour of tobacco above, whitish below ; tail nearly triangular at its base, longer than the body, partly naked on its upper side. Eight inches long.—Paraguay.
- D. murina*, Lin. Desm. Fur yellowish gray above, paler underneath ; eyes surrounded with brown ; tail naked, as long as the body. Surinam.—*Buff.* x. pl. 52, 53.
- D. cinerea*, Tem. Fur short, ash-gray in the males, yellowish gray in the females, white beneath ; tail much longer than the body. Brazils.—*Tem. Mong.*
- D. dorsigera*, Tem. Fur of a uniform brown colour ; head long ; tail hairy at the base.—*Tem. Mong.*
- D. tricolor*, Geoff. (*D. brachyura*, Pallas.) Fur of a blackish brown on the back, reddish on the flanks, and white below ; tail very short, all hairy.—*Pall. Ac. Petrop.* ii. t. 5.
- D. brachyura*, Geoff. Gmel. Fur deep red, brown above, and on the flanks, whitish below ; tail half as long as the body.—*Scba*, i. t. 31.
- D. pusilla*, Desm. The Dwarf Opossum. Fur mouse-colour, whitish below ; tail longer than the body, naked, and of a white colour. Body three inches long.—Paraguay.

Gen. 82. CHIRONECTES, Illiger.—*Didelphis*, Geoff. Cuv.

Incisors $\frac{1}{8}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{3}{2}$ — $\frac{3}{2}$, = ? probably 50, as in the Didelphi. Anterior molars pointed and cutting ; muzzle pointed ; ears naked ; feet pentadactyle, the posterior plantigrade and palmated ; thumb without a nail ; nails of the toes sharp and bent ; tail long, cylindrical, naked, scaly, and prehensile ; abdominal pouch in the female.

C. palmata, Geoff. The Yapock. Fur brown above, with three gray transverse patches or bands ; white beneath. Guiana.—*Griff An. King.* iii. 35.

Gen. 83. DASYURUS, Geoff. Cuv. Desm.—*Didelphis*, Shaw.

Incisors $\frac{8}{6}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{6}{6}$ — $\frac{6}{6}$ = 42. Two first molars compressed and cutting, the others rough with points ; head

conical; five toes on the fore-feet, with crooked nails; four on the hind-feet, and short thumb without a nail; tail long, covered with hair; an abdominal pouch in the females.

D. cynocephalus, Geoff. Desm. Fur yellowish brown; crupper marked with transverse black bands; tail compressed. Nearly four feet long. Van Dieman's Land.—*Lin. Trans.* ix. pl. 19.

M. Temminck makes a new genus of this species under the name of *Thylacynus*.

D. ursinus, Geoff. Desm. Shaw. Fur black; tail not very long, slightly prehensile, naked below. Van Dieman's Land.—*Lin. Trans.* ix. pl. 19.

D. macrourus, Geoff. (*Viverra maculata*, Shaw.) Fur chestnut-coloured, spotted with white; tail also spotted. About the size of a cat. New Holland.—*Peron, Atlas*, pl. 33.

D. Maugei, Geoff. Fur olive-coloured, spotted with white; tail without spots.—New Holland.

D. Viverrinus, Geoff. Fur black, spotted with white; tail without spots. About the size of a rat. New Holland.—*Shaw*, i. pl. 111.

D. tafa, Geoff. (Viverrine Opossum, Shaw.) Fur uniform grayish brown, without spots. New Holland.—*Shaw*, i. pl. 111.

D. penicillatus, Geoff. (*Didelphis penicillata*, Shaw.) Fur ash-coloured, not spotted; tail black and tufted. New Holland.—*Shaw*, i. pl. 113.

D. minimus, Geoff. Fur red, not spotted, with tail of the same colour.—Van Dieman's Land.

The last two species form the genus *Phascogale* of Temminck.

Gen. 84. PERAMELES, Geoff.—*Didelphis*, Shaw.

Incisors $\frac{1}{8}^0$, or $\frac{1}{6}^0$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7}$, or $\frac{8}{6}-\frac{8}{6}$, = 50.

Crowns of the molar teeth acutely tubercular; head very long; muzzle pointed; eyes lateral; fore-feet with five toes, the three middle ones largest; the thumb rudimentary; hind-feet very long, with four toes, two internal and very small, the third very robust; tail long, pointed; base thick and naked beneath, not prehensile.

P. nasuta, Geoff. Desm. Head very long; muzzle slender; nose prolonged; fur grayish brown, white beneath. Incisors $\frac{1}{6}^0$. New Holland.—*An. Mus.* iv. pl. 44.

P. Bougainvillii, Gaimard. Head long; ears ovate, acute; body red above, gray beneath.—*Griff. Syn.* 195.

P. obesula, Geoff. (*Didelphis obesula*, Shaw.) Incisors $\frac{1}{3}^0$; head rather short; forehead convex; fur reddish yellow, white below. New Holland.—*An. Mus.* iv. pl. 45.

Gen. 85. PHALANGISTA, Geoff. Cuv.—*Didelphis*, Shaw, Gmel.

Incisors $\frac{9}{2}$, canines $\frac{1}{6}-\frac{1}{6}$, or $\frac{0}{6}-\frac{0}{6}$, false molars or false canines

$\frac{2}{3}-\frac{2}{3}$, or $\frac{2}{2}-\frac{2}{2}$, molars $\frac{5}{5}-\frac{5}{5}$, or $\frac{6}{5}-\frac{6}{5}$, = 38 or 40. Forehead convex; feet pentadactyle, not united to the body by the skin of the flanks; anterior toes separate, armed with strong crooked nails; posterior with a large nailless thumb; tail naked, or covered with hairs; abdominal pouch in the females.

* *Tail naked, scaly, and prehensile.*

P. maculata, Geoff. (*Didelphis orientalis*, Lin.) Fur whitish, spotted with brown or black; size of a cat. Java.—*Buff.* xiii. t. 11.

P. rufa, Geoff. (*Did. orientalis*, Lin.) Fur reddish or whitish, with a darker dorsal line. Java.—*Buff.* xiii. t. 10.

P. Papuensis, Desm. Fur gray, yellowish, white beneath; ears very small, hairy.—New Guinea.

P. ursina, Tem. Fur thick, black, with a yellowish shade.—*Tem. Mam.* t. 8.

P. Chrysorrhoea, Tem. Fur blackish gray, with a black line on each flank, thick, cottony; head pale ash-gray; rump and tip of the tail golden yellow. Island of Celebes.—*Tem. Mam.* p. 12.

** *Tail hairy.*

P. vulpina, Desm. The Lemurine Opossum. Fur grayish brown above; yellow gray on the head and shoulders; grayish beneath; tail tufted; tip black. New Holland.—*Shaw*, i. pl. 110.

P. Cookii, Cuv. Desm. Fur brown, or reddish gray above, white beneath; tail brown; the tip white; size of the polecat. Van Dieman's Land.—*Cook's Voy.* iv. pl. 8.

P. nana, Geoff. Desm. Fur reddish gray above, white below; tail brown. Van Dieman's Land.—*Desm.* 268.

Gen. 86. PETAURISTA, Cuv. Geoff.—*Didelphis*, Shaw.

Incisors $\frac{6}{2}$, canines $\frac{1}{0}-\frac{1}{0}$, or $\frac{1}{2}-\frac{1}{2}$, molars $\frac{6}{6}-\frac{6}{6}$, or $\frac{7}{6}-\frac{7}{6}$, = 32 or 34. Head rather long; eyes small; ears long; feet short, pentadactyle; the hinder ones with a large nailless thumb, and the two first toes short and united; nails compressed, arched, and very strong; skin of the sides extended, and uniting the extremities, so as to form a kind of parachute; tail long, hairy, not prehensile.

* *Tail round.*

P. taguanoides, Desm. (*Didelph. petaurus*, Shaw.) Fur very soft, gray brown above; throat and breast white; tail brown, paler at the base. New Holland.—*Shaw*, i. t. 112.

P. macroura, Desm. (*Did. macroura*, Shaw.) Fur grayish brown above, whitish beneath; tail slender, longer than the body. New Holland.—*Shaw*, i. pl. 113.

P. flaviventer, Geoff. Desm. Fur chestnut brown above, yellowish white beneath; tail round, a little longer than the body. New Holland.—*Desm.* 269.

- P. sciurea*, Shaw. Fur ash-gray above; edges of the membrane and dorsal line deep brown, beneath white; tail reddish gray at the base, blackish at the extremity. New Holland.—*Shaw*, i. pl. 113.
- P. Peronii*, Desm. Body brown above, white beneath; membrane of the flanks brown; legs and end of tail white. New Holland.—*Shaw*, i. p. 500.

** *Tail feathery.*

- P. pygmaea*, Desm. Fur uniform, mouse-gray, with a reddish cast on the back, whitish below. New Holland.—*Shaw*, i. pl. 114.

Gen. 87. POTOROUS, Desm.—*Macropus*, Shaw.

Incisors $\frac{6}{2}$, canines $\frac{1}{0}-\frac{1}{0}$, molars $\frac{5}{2}-\frac{5}{2} = 30$. Four posterior molars in either jaw with blunt tubercles; head long and pointed; ears large; upper lip cleft; fore-feet short, with five toes; hind-feet long, with four toes, two of which united and small; tail long, robust; hair woolly; an abdominal pouch in the female.

- P. murinus*, Desm. (*Macropus minor*, Shaw.) Fur brownish above, gray beneath. New Holland.—*Shaw*, i. pl. 116.

Gen. 88. KANGURUS, Geoff. Laccp. Desm.—*Macropus*, Shaw.

Incisors $\frac{6}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{2}-\frac{5}{2} = 28$. Ears large, pointed; eyes large; fore-legs very short, with five toes and strong nails; hind legs long, robust, with four toes; the two internal united and small, the central large with a strong claw like a hoof, plantigrade; tail very strong, with powerful muscles, not prehensile, but serving for locomotion; an abdominal pouch.

- K. labiatus*, Geoff. (*Macropus major*, Shaw.) Large Kangaroo. Fur ash gray above, white beneath; a gray line across the chin; legs and upper part of the tail blackish. New Holland.—*Shaw*, i. pl. 115.
- K. fuliginosus*, Peron, Geoff. Fur sooty brown above, grayish below; the legs and tail blackish. New Holland.—*Desm.* p. 273.
- K. rufus*, Desm. Fur woolly, clear red above, white beneath. New Holland.—*Mam.* 541.
- K. rufo-griseus*, Desm. Geoff. Fur reddish gray above, paler beneath; legs and end of the tail passing into brown; tail reddish. New Holland.—*Mam.* 273.
- K. ruficollis*, Geoff. Fur hare gray above, pure white beneath; neck and upper part of the shoulders red mixed with gray. King's Island.—*Mam.* 274.
- K. Eugeniei*, Desm. Fur grayish brown above; front of the fore-legs reddish, whitish below. New Holland. Perhaps the young of the former species?—*Mam.* 274.
- K. fasciatus*, Desm. Fur gray with a brown band across the back and loins. New Holland.—*Peron. Voy.* t. 27.

K. Billardierii, Desm. Ears short, oval, rounded; fur gray brown above, reddish beneath; upper lip reddish.—Van Dieman's Land.

K. Brunii, Desm. Fur brown above, fawn-coloured beneath. Aroe Islands.—*Shaw*, i. 402.

K. pencillatus, Geoff. Fur above gray, with darker tints, beneath rufous brown; tail as long as the body, and tufted at the end. New Holland.—*Griff. An. King.* iii. 48.

Gen. 89. PHASCOLARCTOS, *Blainville*.

Incisors $\frac{6}{2}$, false canines $\frac{2}{0}-\frac{2}{0}$, molars $\frac{4}{4}-\frac{4}{4} = 28$. Four intermediate teeth between the incisors and the upper molars; molars with four tubercles; ears large and pointed; feet pentadactyle; toes of the fore-feet in two groups, the thumb and index finger on one side, the three others on the opposite; thumb of the hind-feet large, nailless; the two next toes united.

P. fuscus, Desm. The Koala, Cuv. Fur of an uniform chocolate colour, long and thick. Size of a moderate dog. New Holland.—*Cuv. Reg. An.* iv. t. 1.

Gen. 90. PHASCOLOMYS, Geoff. Cuv.—*Didelphis*, Shaw.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{5}-\frac{5}{5} = 24$. Incisors strong and thick; molars with oval crown, divided by a furrow; body thick; head large, flat; ears short; eyes much separated; feet with five toes, the anterior armed with crooked and robust nails for digging; thumb of hind-feet very small, nailless; tail scarcely apparent; an abdominal pouch in the female.

P. wombat, Peron, Desm. The Wombat. Fur uniform grayish colour. Size of the badger. New Holland.—*Desm. Mam.* 276.

ORDER VI. GLIRES, Lin.—*Rosores*, Storr.—*Rodentia*, Cuv.

Two large incisors in each jaw, separated from the molars by a vacant space; no canine teeth; molars with flat crowns or blunt tubercles; extremities, the posterior longest, terminated by unguiculated toes, the number varying according to the species; mammæ variable in number; stomach simple; intestines very long.

Section 1.—*With complete clavicles.*

Gen. 91. CASTOR, Lin. Cuv. Geoff.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4} = 20$. Molars composed of a flat crown, with sinuous and complicated ridges of enamel; five toes on each foot, the anterior short and close, the

posterior longer and palmated; tail broad, thick, flattened horizontally, of an oval form, naked, and covered with scales.

- C. *fiber*, Lin. The Beaver. Fur consisting of two sorts of hair, one coarse and brownish, the other downy, more or less gray. About two feet long. North America and Europe.—*Penn. Brit. Zool.* i. pl. 9.

The Beaver has been long celebrated for its intelligence and social instinct. It is found on the banks of rivers and lakes in North America, living in troops more or less numerous in a kind of huts, constructed near the margin of the water. They intercept the water, to form ponds attached to their dwellings, by strong arched dikes, of which the convexity is opposed to the current. These dikes are formed of stones, mud, and branches of trees. Their huts, composed of the same materials, are situated on the margin of the ponds, and generally of an oval form, with a rounded top, the diameter of which is proportioned to the number of individuals who are its inmates. The entrance to this cabin is from the lowest part, descending into the water, through which alone they enter, the principal part of the dwelling being above its level. The beaver uses its teeth to cut the branches of trees necessary for its purpose, as well as to transport the different materials of its structure; and the combination of means to this end in a number of individuals has approximated in the minds of some the social instinct of animals to something approaching to reason. But in captivity the beaver shows nothing of the social instinct, and very little intelligence. The period of gestation in the beaver is four months, and it brings forth two or three young. They are at their full size in two years, and the duration of their life is about fifteen.

The beaver is subject to considerable variety of colour, and individuals have been noticed from totally black to different shades of yellow or fawn-colour and white.

A fossil species, the *C. trogontherium* of Fischer, resembles in its characters the present species, though its dimensions seem to have been much larger.

Gen. 92. FIBER, Cuv. Geoff.—*Mus*. Gmel.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{3}{3}-\frac{5}{3} = 16$. Molars with a flat crown, and scaly angular zigzag plates of enamel; fore-feet with four toes and the rudiment of a thumb; posterior with five, edged with stiff and close bristles; tail long, compressed laterally, naked, except a few scattered hairs, and granular.

- F. *Zibethicus*, Desm. (*Castor Zibethicus*, Lin.) The Ondatra or Musk Rat. Fur clear brown, tinged with red above, cinereous beneath. About the size of a rabbit. Canada.—*Buff.* x. pl. 1.

Gen. 93, ARVICOLA, Desm.—*Mus*, Lin.—*Lemmus*, Geoff.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{3}{3}-\frac{5}{3} = 16$. Molars with a flat crown and angular plates of enamel; ears large; anterior toes with nails; tail round, hairy, almost the length of the body.

- A. *amphibius*, Desm. (*Mus amphibius*, Lin.) The Water Rat. Fur blackish-gray, slightly mixed with yellowish, lighter beneath; tail black. A little larger than the common rat. Old and New Continents. B.—*Buff.* vii. pl. 43.

Var. A. All black.—Var. B. With a large white spot on the shoulders.—Var. C. Black, feet covered with white hairs.

- A. *Argentoratensis*, Desm. Fur of a brownish black, mixed with gray; tail brown, almost naked. Six inches long. Found near Strasbourg.—*Buff. Sup.* vii. pl. 70.

- A. Niloticus*, Desm. Egyptian Arvicola. Fur brown, mixed with yellow, above yellowish, gray beneath; ears large, naked. *Mam.* 281.
- A. albicaudatus*, Desm. Fur brown, with the feet and upper side of the tail white.—*Mam.* 281.
- A. vulgaris*, Desm. (*Mus agrestis*, Lin.) The Field Mouse. Of a reddish ash-colour above, paler below; ears small and round. Europe and Northern Asia.—*Buff.* vii. pl. 47.
- A. fulvus*, Desm. (*Lemmus fulvus*, Geoff.) About four inches long; reddish yellow; belly and feet paler; tail not half the length of the body. France.—*Mam.* 282.
- A. xanthognatus*, Desm. Fur fawn-coloured, variegated with black above, cinereous beneath; cheeks yellowish. Hudsons Bay.—*Leach, Nat. Mis.* i. t. 26.
- A. œconomus*, Desm. (*Mus œconomus*, Gmel.) Fur brown above, passing into yellow on the flanks; throat and belly white; tail one-fourth the length of the body. Siberia.—*Pall. Glir.* pl. 14, A.
- These little animals construct their burrows below the surface of the turf in the form of an arched chamber about a foot in diameter. To this chamber they make numerous small holes or entrances, and near this principal apartment they form magazines, in which they deposit in some cases from twenty to thirty pounds of roots, collected by the females during summer for their winter provision. The migrations of this species, like the Lemming, take place in vast phalanxes at uncertain periods, is conducted in the same manner, and is probably caused by excessive production and want of food. The natives of Kamtschatka often rob the hoards of these provident little animals, leaving a ridiculous present at the place in return.
- A. saxatilis*, Desm. Fur brown, mixed with gray above, deep gray on the sides, cinereous below; tail as long as the body. Siberia.—*Pall. Glires*, pl. 23, B.
- A. alliarius*, Desm. About four inches long; fur ash-coloured above, white beneath; ears large, almost naked. Siberia.—*Pall. Glires*, pl. 14, C.
- A. rutilus*, Desm. Rather less than the preceding; fur reddish above, dirty white below; tail a third of the length of the body. Siberia.—*Pall. Glires*, pl. 14, B.
- A. gregalis*, Desm. Fur pale gray on the back, mixed with long black hairs; belly white; tail blackish, one-fourth the length of the body. Three inches long. Siberia.—*Pall. Glir.* pl. 17.
- A. socialis*, Desm. (*Mus gregarius*, Lin.) Fur pale gray above, white underneath; ears short, broad, almost naked. About three inches long; tail one inch. Deserts near the Caspian Sea.—*Pall. Glir.* pl. 13, B.
- A. Astrachanensis*, Desm. Fur yellowish above, cinereous below. Four inches long; tail one inch. Astracan.—*Mam.* p. 285.
- A. pumilio*, Desm. Fur bright brown above, with four longitudinal black bands. Cape of Good Hope.—*Shaw*, ii. pl. 133.
- A. hortensis*, Harlan. Fur above ferruginous brown, sides lead-coloured, yellow beneath; hair coarse; ears broad, oval. Inhabits Florida.—*Faun. Amer.* 138.

A. palustris, Harlan. Fur dark grayish brown above, lead-coloured below; ears slightly edged with hair; tail short, slightly hairy. Inhabits the shores of the Delaware.—*Faun. Amer.* 136.

A. Pennsylvanica, Ord. Fur brownish fawn-coloured above, grayish white beneath; eyes very small; ears short and round. Pennsylvania.—*Wilson, Ornith.* vi. t. 50, fig. 3.

A. Floridanus, Harlan. Fur lead-colour, mixed with black on the dorsal line, yellowish on the flanks; ears large and membranous. Body about eight inches long. Florida.—*Faun. Amer.* 142.

This is the type of the genus *Neotoma* of Messrs Say and Ord, which differs from the *Arvicolæ* in the teeth being furnished with roots.

Gen. 94. LEMMUS, Cuv. Geoff.—*Mus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{3}{3}$ — $\frac{3}{3}$ = 16. Molars with a flat crown and angular plates of enamel; ears very short; fore-feet in some species with five, in others four toes, proper for digging; tail short and hairy.

L. Norvegicus, Desm. (*Mus Lemmus*, Lin.) The Lemming. Fur of a red fawn-colour, variegated with black and brown; five toes on the fore-feet. Norway and Lapland.—*Pall. Glir.* t. 12, A, B.

The migratory habits of these animals are very remarkable. They inhabit the alpine or mountainous parts of Lapland and Norway; and at particular but uncertain periods they descend into the plains in immense troops, devouring every thing in their passage. Their migrations are continued in a direct line, and no obstacles in their way have any effect in altering their route; neither ravines, torrents, marshes, or lakes, nor even fires, make them deviate from their line of march. If a rick of hay or corn occurs in their passage they eat through it; and insurmountable objects make them only deviate till the obstacle is passed. The grass is destroyed to the very roots in the line of their march, and the ground appears as if ploughed. The cause of these periodical migrations is not known. They seldom happen more than once in ten years. Want of food and excessive multiplication have been assigned as the probable causes; and it has been remarked that their migrations take place in the autumn of such years as are followed by a severe winter. If the instinctive propensity arises from the numbers being too great for the supply of food, the object is amply attained; for the greater part of these immense hosts is destroyed by various enemies, owls, hawks, weasels, &c. and numbers perish in the waters which their blind instinct impells them to cross. Few survive to return to their native mountains.

L. zokor, Desm. (*Mus aspalax*, Pall.) The Daurian Rat, Penn. Body reddish gray; tail short; fore-feet pentadactylous; the three intermediate nails very long; eyes very small. Inhabits the Altaic Mountains.—*Pall. Glir.* t. 10.

L. Talpinus, Desm. Fur gray brown above, whitish underneath; fore-feet pentadactyle, with pretty strong nails; eyes small; tail very short. Inhabits Southern Russia.—*Pall. Glir.* t. 11, A.

L. Hudsonius, Desm. Fur cinereous, with a dusky stripe down the middle; fore-feet with four toes and the rudiment of a thumb; the two middle nails very large, and apparently divided. Inhabits Labrador.—*Pall. Glir.* t. 26. fig. A, B, C.

L. torquatus, Desm. Fur ferruginous, with a black dorsal line and a white collar; fore-feet pentadactylous; nail of the thumb short and rounded. Inhabits Siberia.—*Pall. Glir.* t. 11, B.

- L. lagurus*, Desm. Fur cinereous, with a black dorsal line and no collar; fore-feet pentadactyle; tail very short. Inhabits Siberia.—*Pall. Glir. t. 13, A.*
- L. terrestris*, F. Cuv. Fur blackish gray, slightly variegated with yellow, paler beneath; tail black. Europe.—*F. Cuv. Mam.*

Gen. 95. ECHIMYS, Geoff. Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4}$, = 20. Molars simple, with transverse plates united by twos at the end, or isolated; four unguiculated toes and the vestige of a thumb on the fore-feet, five on those behind; tail long, scaly; the back more or less covered with flat spines.

E. cristatus, Desm. Fur chestnut-coloured above; head deep brown, with a narrow white stripe down the middle; tail longer than the body, black, with its last half white or yellowish. Surinam.—*Buff. Sup. vii. pl. 72.*

E. dactylinus, Geoff. Fur of the back deep brown, mixed with gray and yellow, reddish on the flanks; two middle toes of the fore-feet longest; tail longer than the body.—S. America.

E. spinosus, Desm. Fur dark brown, mixed with reddish above, white beneath; hairs on the back mixed with strong spines. Seven inches long. South America.—*Mam. 291.*

E. hispidus, Geoff. Fur reddish brown, lighter underneath; head reddish; tail as long as the body, scaly; hairs of the back very rough. S. America.—*Desm. Mam. 292.*

E. didelphoides, Geoff. Fur brown upon the back, yellowish below; tail the length of the body, the greater part naked and scaly. S. America.—*Desm. Mam. 292.*

E. Cayennensis, Geoff. Fur red, passing to brown on the back, white below; hind-feet with long tarsi, and three middle toes equal. S. America.—*Desm. Mam. 292.*

E. setosus, Geoff. Fur red, soft, with few spines, whitish below; end of the feet white; tail rather longer than the body.—S. America.

Gen. 96. MYOXUS, Cuv. Geoff.—*Mus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4}$, = 20. Molars simple, with transverse projecting lines; fore-feet with four toes and the rudiment of a thumb; tail very long, round, with hair tufted or depressed.

M. glis, Desm. (*Sciurus glis*, Lin.) The Fat Dormouse. Fur brownish ash-coloured above, whitish below, with brown round the eyes; tail hairy. Six inches long. Europe.—*Buff. viii. pl. 24.*

The *M. dryas* of Schreber is considered a variety of the *M. Glis*.

The Dormouse resembles the squirrel in its manners and food. It couples in spring, and the female brings forth four or five at a birth. On the approach of winter this little animal retires into the crevices of rocks or cavities of trees, rolls itself up into a ball and passes the winter in torpidity, awaking, however, to take food when the temperature is raised. It is used for food in Italy, as it was by the ancient

Romans, who fattened them for the table in receptacles called *Gliraria*. The common Dormouse has the same habits.

M. nitela, Desm. Garden Dormouse. Fur gray brown above, whitish below; a black spot round the eyes extending to behind the ear; tail long, black, with a white tuft at the end. Inhabits Europe.—*Buff.* viii. pl. 24.

M. avellanarius, Desm. The Common Dormouse. Fur clear fawn-colour above, whitish below; tail the length of the body, flattened horizontally, the hairs distichous. Europe. B.—*Schreb.* pl. 227.

M. murinus, Desm. Fur gray, paler beneath; tail as long as the body, flattened, with distichous hairs. Cape of Good Hope.—*F. Cuv. Mam.* No. 17.

M. Africanus, Shaw. Fur pale ferruginous above, whitish beneath, with a white line above each eye; tail black in the middle.—*Shaw*, ii. 172.

Gen. 97. HYDROMYS, Geoff. Cuv.—*Mus.* Gmel.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{2}{2}-\frac{2}{2}$, = 12. Molars with flat crown, the plates of enamel having the appearance of the figure 8, with two hollows; ears small and round; feet pentadactyle, the toes of the hind-feet united by a membrane; tail cylindrical, covered with hair and pointed.

H. chrysogaster, Geoff. Fur chestnut above, orange-coloured below. One foot long. Van-Dieman's Land.—*An. Mus.* vi. pl. 36.

H. leucogaster, Geoff. Fur brown above, white below. Van-Dieman's Land. One foot long.—*An. Mus.* vi. pl. 36.

H. Coypus, Geoff. The Coypou. Fur brown chestnut on the back, red on the flanks, and light brown on the belly. Twenty inches long. Inhabits South America.—*An. Mus.* vi. pl. 35.

This species is the type of M. F. Cuvier's genus *Myopotamus*. It is nearly allied to the beaver, and its fur is known in trade by the name of Racoonda, and used in the manufacture of hats.

Gen. 98. *Mus*, Lin. Cuv.—*Rattus*, Penn.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{5}-\frac{5}{5}$, = 16. Molars with tuberculous crowns; four toes and rudimentary thumb on the fore-feet; hind-feet with five unguiculated toes; ears oblong or round, naked; tail long, naked and scaly; fur with scattered hairs, longer and stiffer than the others, sometimes forming a kind of spines.

* *Spineless rats of the Old Continent.*

M. giganteus, Hardwick. The Malabar Rat. Fur of an obscure brown on the back, gray under the belly; feet black. Body above a foot long. Inhabits Malabar.—*Lin. Trans.* vii. t. 8.

M. Javanus, Desm. Fur brown red above, extremities of the feet whitish; tail shorter than the body; feet not palmated. Nine inches long. Inhabits Java.—*Mam.* 298.

M. caraco, Pallas. Fur mixed with reddish and gray, deeper on the back than the sides; feet and belly whitish; tail rather more than half the length of the body; feet semipalmated. Seven inches long. Inhabits Siberia.—*Pall. Glir.* t. 23.

M. decumanus, Desm. Norway Rat. Fur gray brown above, whitish below; tail almost the length of the body; toes free. Nine inches long.—*Shaw*, ii. pl. 130.

This well-known animal is originally from Persia or India, and was not known in England previous to the year 1730. It is now naturalized in all the countries of Europe, and in America, and in Britain has almost expelled the black rat.

M. Indicus, Geoff. Fur reddish gray above, gray below; legs reddish; tail a little shorter than the body; feet not palmated. Inhabits India.—*Desm. Mam.* 299.

M. Alexandrinus, Geoff. Fur reddish gray above, cinereous below; tail one-fourth longer than the body; feet not webbed. Inhabits Egypt.—*Geoff. Eryp.* pl. 3. fig. 1.

M. rattus, Lin. The Black Rat. Fur blackish above, deep ash-coloured below; tail longer than the body. Seven or eight inches long. Originally from India, but spread over the civilized world.—*Shaw*, ii. pl. 130.

M. sylvaticus, Lin. The Field Mouse. Fur reddish gray above, whitish below; tail shorter than the body. Five inches long. Europe. B.—*Shaw*, ii. pl. 132.

M. campestris, F. Cuv. The Dwarf Mouse. Ears short, rounded; fur fawn-gray above, white below. About two inches and a-half long. France.—*Desm. Mam.* 543.

M. musculus, Lin. The Mouse. Dusky gray above, cinereous below; tail about as long as the body. About four inches long. Sometimes found all white. Europe. B.—*Shaw*, ii. pl. 131.

M. messorius, Shaw. The Harvest Mouse. Fur mouse gray, mixed with yellowish above; belly and feet white; tail a little shorter than the body. Two inches and a-half long. Inhabits England.—*Shaw*, ii. frontispiece.

This is the smallest of British quadrupeds, two of them weighing about the third of an ounce. They build their nests amidst the straws of corn, and sometimes in thistles, and are often carried into the barn-yard with the sheaves.

M. agrarius, Pall. Fur reddish gray, with a black dorsal line; tail half the length of the body. About three inches long. Russia.—*Pall. Glir.* pl. 24, A.

M. subtilis, Pall. Fawn-coloured, with a black dorsal line, ears folded; tail rather longer than the body. About three inches long. Inhabits Tartary and Siberia.—*Pall. Glir.* t. 22. fig. 2.

There are several varieties in colour of this species. They live in trees, which they climb with ease. They have some analogy with the dormice, and like them want the gall-bladder, but differ from them in having a cæcum. Mr Gray has formed them into a separate genus under the name of *Sicista*.

M. striatus, Lin. Fur reddish gray above, with lines of longitudinal white spots. East Indies.—*Shaw*, ii. pl. 133.

- M. Barbarus*, Lin. Fur brown, with ten longitudinal whitish lines ; three toes on the anterior feet. Northern Africa.—*Shaw*, ii. 70
- M. soricinus*, Desm. Fur yellowish gray above, whitish below ; muzzle elongated ; ears orbicular, hairy ; tail as long as the body. $2\frac{1}{2}$ inches long. Vicinity of Strasbourg.—*Shaw*, ii. pl. 133.
- M. minutus*, Pall. Fur ferruginous above, whitish below ; muzzle slightly elongated. Body about two inches long. Inhabits Russia.—*Pall. Glir.* pl. 24, B.
- M. frugivorus*, Raf. Fur reddish brown, with scattered long hairs, white below ; ears naked, rounded ; tail as long as the body. Inhabits Sicily, on trees.—*Griff. Syn.* 229.
- M. dichrurus*, Raf. Fur gray and brown ; head with a brown band ; tail as long as the body. Inhabits Sicily.—*Griff. Syn.* 229.
- M. setifer*, Horsf. Fur bristly, back gray, blackish brown beneath ; ears large, rounded, nearly naked ; tail long. Java.—*Horsf. Jav.*
- M. Islandicus*, Thienemann. Iceland Rat. Fur black above ; red gray, spotted with yellow on the sides ; tail nearly naked, scaly, a little longer than body. N. of Europe.—*Natur. Bemerk.* i. t. 22.
- M. Donovanii*, Griff. Fur blackish gray, with three small dorsal bands ; tail rather hairy. Cape of Good Hope.—*Nat. Rep.* t. 35.

** *American Spineless Rats.*

- M. Angouya*, Desm. Fur yellow brown above, whitish beneath ; tail rather longer than the body ; ears rounded.—Paraguay.
- M. rufus*, Desm. Reddish fawn-colour, darker on the head and back ; belly yellowish ; tail rather more than half the length of the body. About six inches long. Inhabits Paraguay.—*Mam.* 305.
- M. cephalotes*, Desm. Head very large ; muzzle short ; fur brown above, whitish below ; tail as long as the body. Four inches long. Inhabits Paraguay.—*Mam.* 305.
- M. auritus*, Desm. Head thick ; ears long ; fur mouse-colour, lighter beneath ; tail shorter than the body. Four inches and a-half long. Inhabits Buenos Ayres.—*Mam.* 306.
- M. nigripes*, Desm. Head thick ; ears short and round ; yellow brown above, white below ; feet deep black. Three inches and a-half long. Inhabits Paraguay.—*Mam.* 306.
- M. Laucha*, Desm. Muzzle pointed ; fur lead-colour, paler below ; tail shorter than the body. $2\frac{1}{4}$ inches long.—Buenos Ayres.
- M. leucopus*, Desm. Brownish yellow above, white beneath ; ears large ; feet white, tail as long as the body. Five inches long. Inhabits United States.—*Mam.* 307.
- M. nigricans*, Desm. Fur black above, gray below ; tail black, longer than the body. Six inches long.—United States.

*** *Spinous Rats.*

- M. Perchal*, Shaw. Fur reddish brown, mixed with spiny hairs,

grayish below ; tail not so long as the body. Body 18 inches long. India.—*Buff. Supp.* vii. pl. 69.

M. Cahirinus, Geoff. The Egyptian Rat. Fur ash gray, deeper above than below, composed of rough spiny hairs ; tail as long as the body. Four inches long. Egypt.—*Geoff. Egyp.* pl. 5. fig. 2.

Gen. 99. CRICETUS, Lacep. Cuv.—*Mus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{3}{3}$ — $\frac{3}{3}$ = 16. Crown of the molars with blunt tubercles ; fore-feet with four toes and a rudimentary thumb ; hind-feet pentadactyle, with strong nails ; tail short and hairy ; cheek-pouches.

C. vulgaris, Desm. (*Mus cricetus*, Lin.) The Common Hamster. Fur reddish gray above, black below ; with three large yellowish spots on each side ; a white spot on the throat and another under the breast. Inhabits the northern and central parts of Europe and Asia. Eight inches long.—*Shaw*, ii. pl. 137.

The Hamster forms complicated burrows or excavations of a circular form from one to five feet in diameter, communicating by horizontal passages. In one of these is the retreat of the animal, furnished with dry herbs for its bed—the others are magazines for its winter provisions, which frequently contain many bushels of corn or other grain. These burrows are frequently sought, both to destroy the animal which robs the agriculturist of so much produce, and to appropriate their supplies. In the environs of Gotha it is said that in a single year 80,000 hamsters have been killed. The hamster is larger than the common rat ; is provided with cheek-pouches ; brings forth frequently, and from six to twelve young. On the approach of winter the entrances to their burrows are closed up, and they are supposed to pass this season partly in a state of torpidity.

C. migratorius, Desm. (*Mus accedula*, Pall.) Fur ashy gray above, white on the muzzle, round the nostrils and feet ; ears notched ; Length four inches. Siberia.—*Pall. Glir.* pl. 18, A.

C. arenarius, Desm. (*Mus arenarius*, Gmel.) Sand Hamster. Whitish ash-coloured above, pure white beneath ; feet and tail white ; ears round. Four inches long. Siberia.—*Pall. Glir.* pl. 16, A.

C. phæus, Desm. (*Mus phæus*, Gmel.) Fur brownish ash-coloured above, whitish below ; ears oval and large. Inhabits Persia.—*Pall. Glir.* pl. 15, A.

C. songarus, Desm. (*Mus songarus*, Pall.) Fur ash-coloured on the back, with a black dorsal line ; sides varied with white and brown. Length three inches. Siberia.—*Shaw*, ii. pl. 139.

C. furunculus, Desm. (*Mus furunculus*, Pall.) Fur ashy above, with a black dorsal line ; belly and feet white.—*Pall. Glir.* tab. 15, B.

C. bursarius, Desm. (*Mus bursarius*, Lin. Trans.) Canada Hamster. Fur gray ; fore-feet pentadactylous, with long digging nails ; ears short. Length 11 inches. Canada.—*Shaw*, ii. pl. 138.

C. laniger, Desm. (*Mus laniger*, Gmel.) The Chinchilla. Fur gray and white, the hair soft and downy ; ears large and round ; tail short, with long stiff hairs. 11 inches long. Chili.—*Griff.* iii. 138.

C. anomalus, Desm. Fur chestnut brown above, white below, some

flat spines on the back ; tail nearly as long as the body, scaly and black. Isle of Trinity, Gulf of Mexico.—*Mam.* 313.

Gen. 100. *DIPUS*, Cuv. Geoff. Gmel.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{3}-\frac{3}{3}$ or $\frac{4}{3}-\frac{4}{3} = 16$ or 18. Molars simple, with tuberculous crowns ; eyes large ; ears long, pointed ; posterior extremities much elongated, with the number of toes variable, but having only one metatarsal bone ; tail very long, tufted.

These singular animals, approaching something in form to the Kangaroo, but very different in other particulars, were formerly supposed to walk solely upon their hind-feet ; but subsequent observation has proved this to be wrong. They usually walk on all-fours, but when alarmed endeavour to escape by prodigious leaps, springing from their hind-feet by the assistance of their tail, their fore-feet being pressed close to their breast on these occasions.

D. maximus, Blainv. The Great Jerboa. Fur bright gray above, with a black line over each eye, uniting on the forehead ; four toes on the fore-feet, and three on those behind. Size of a rabbit.

D. gerboa, Desm. (*Mus jaculus*, Lin.) The Jerboa. Fur bright fawn-colour above, white underneath ; tail tufted ; three toes on the hind-feet, the middle one longest. About six inches long. Barbary, Egypt, &c.—*Shaw*, ii. pl. 157.

D. jaculus, Desm. (*Mus jaculus*, Pall.) Pale fawn-coloured above, white below ; muzzle white, and a white band across the buttocks ; five toes on the hind-feet ; ears long. Seven inches long. Tartary.—*Shaw*, ii. pl. 158.

D. brachyurus, Desm. Pale fawn-coloured above, white below ; a white crescent-shaped spot on the buttocks ; muzzle white at its extremity, brown above ; tail and limbs thick ; ears short ; hind-feet pentadactyle. Four inches and a-half long.—Siberia.

D. minutus, Desm. Fur pale yellowish gray, whitish underneath ; the extremities and transverse stripe on the buttocks white ; hind-feet pentadactyle. Four inches long.—Shores of the Caspian sea.

Gen. 101. *GERBILLUS*, Desm. F. Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{3}-\frac{3}{3} = 16$. Molars tuberculous ; posterior extremities very long, with five toes, each with its proper metatarsal bone ; tail long, covered with hair.

G. tamariscinus, Desm. (*Mus tamariscinus*, Pall.) Fur grayish yellow above, white below ; tail nearly as long as the body, annulated with brown. Six inches and a-half long. Shores of the Caspian Sea.—*Shaw*, ii. pl. 160.

G. meridianus, Desm. (*Mus longipes*, Lin.) Fur grayish fawn-colour above, white below, with a central line of red brown on the belly. Body four inches long. Deserts near the Caspian Sea.—*Shaw*, ii. pl. 160.

G. Indicus, Desm. Fur chestnut above, sprinkled with small brown

spots longitudinally, white below ; tail a little longer than the body, with a tuft of brown hair. Hindostan.—*Desm. Mam.* p. 321.

G. *Ægyptius*, Desm. (*Dipus pyramidum*, Geoff.) Upper part of the body bright yellow, under part pure white ; tail a little longer than the body, brown, and terminated by a few long hairs. About the size of a mouse. Egypt.—*Oliv. Voy.* pl. 28. A, B, C.

G. *Canadensis*, Desm. Canadian Gerbo, Shaw. Fur yellowish above, white below ; ears short ; tail almost naked, rather longer than the body. Inhabits Canada.—*Shaw*, ii. pl. 161.

G. *Labradorius*, Sabine. Fur brown above, white beneath, without a dividing line ; toes four before, five behind ; tail more than half the length of the body. Labrador.—*Faun. Amer.* p. 157.

M. Rafinesque has named six other species of Gerbilli as natives of North America. These are the G. *oricinus*, *megalops*, *leconurus*, *Hudsonius*, *macrourus*, and *brachyurus*.

Gen 102. ASPALAX, Desm. Oliv.—*Spalax*, Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{3}{3}-\frac{3}{3}$, = 16. Molars simple, with blunt tubercles ; body long, cylindrical ; eyes very small, and concealed by the skin ; no external ears ; feet short, pentadactylous ; no tail.

A. *typhlus*, Desm. (*Mus typhlus*, Pall.) Fur ash-coloured, tinted with reddish. Eight inches long. Asia Minor, &c. The Aspalax or mole of the ancients.—*Pall. Glir.* pl. 8.

Var. with large irregular white spots.

Gen. 103. BATHYERGUS, Cuv.—*Mus*, Pal.—*Orycterus*, F. Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4}$, = 20. Incisors very long, broad ; molars slightly tuberculous, notched on the edges ; body thick and cylindrical ; head thick ; muzzle truncated ; eyes small ; no external ears ; feet short, pentadactyle, with strong nails ; tail very short.

B. *maritimus*, Desm. (*Mus maritimus*, Gmel.) Fur whitish gray ; tail flat, covered with stiff hairs. About a foot long. Cape of Good Hope.—*Shaw*, ii. pl. 140.

B. *Capensis*, Desm. (*Mus Capensis*, Pall.) Fur brown, with white round the eyes and ears, on the tip of the head, and at the end of the muzzle. About six inches long. Cape of Good Hope.—*Shaw*, ii. pl. 140.

Gen. 104. PEDETES, Desm.—*Dipus*, Gmel.—*Helamys*, F. Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4}$, = 20. Molars with a cylindrical crown and a circle of enamel divided into two parts ; head short, broad, and flat between the ears ; muzzle obtuse ; ears long, thin, narrow, pointed ; eyes large ; no cheek-pouches ; whiskers large ; fore-feet short, with five toes and long nails ; hind-feet very long, four-toed ; tail long, thick ; an abdominal pouch, but not inclosing the teats.

P. Capensis, Desm. (*Mus Cafer*, Pallas.) Fur bright fulvous, mixed with black above, white below; legs brown; tail slender, black at the end. Cape of Good Hope.—*Buff. Supp.* vi. pl. 41.

Gen. 105. ARCTOMYS, Geoff. Cuv.—*Mus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{5}{4}$ — $\frac{5}{4}$, = 22. Incisors very strong; molars with ridges and blunt tubercles; body thick and heavy; head large; no cheek-pouches; ears short and rounded; eyes large; feet robust, those before with four toes and a rudimentary thumb; those behind with five toes, the nails strong, compressed, and crooked.

* *No cheek-pouches.*

A. Bobac, Desm. (*Mus arctomys*, Pallas.) Fur yellowish gray, with a red tint near the head; under part of the body reddish. 15 inches long. Poland and Northern Russia.—*Shaw*, ii. pl. 144.

A. marmotta, Desm. (*Mus alpinus*, Pliny.) The Marmot. Fur yellowish gray, top of the head and end of the tail black. Eighteen inches long. Mountains in Europe and Asia.—*Shaw*, ii. pl. 143.

The Marmots live on the elevated sides of the highest mountains, near the limit of perpetual snow. They are found in families of from six to fifteen: and towards the month of September dig a hole on a southern exposure, which at five or six feet from its entrance divides into two branches, leading to chambers of from three to seven feet in diameter, stored with hay and moss, where they hibernate. When they leave their retreat to seek food, a sentinel is placed upon a height to give the alarm, which he does by a kind of whistle, when they retire to their holes. They store up no provisions, their long torpor rendering this unnecessary; but at the end of autumn they are very fat, and are then taken in great numbers to be used as food.

A. monax, Desm. (*Mus monax*, Lin.) Fur brown above, paler on the sides and belly; muzzle bluish gray; tail half as long as the body, black. 16 inches long. N. America.—*Shaw*, ii. pl. 143.

A. empetra, Desm. Quebec Marmot, Penn. Fur blackish brown, dotted with white above, red ferruginous below; tail short. Canada.—*Penn. Quad.* ii. pl. 74, fig. 1.

A. brachyura, Rafinesque. Cinereous brown above, light red below; tail short, flat, reddish.—Missouri.

Several other animals said to belong to this genus are excluded by Desmarest as not being sufficiently ascertained.

** *With large cheek-pouches.* SPERMOPHILUS, F. Cuv.

A. citillus, Desm. (*Mus citillus*, Pall.) Fur gray brown above, waved or spotted with white; white below; cheek-pouches.—Europe and Asia.

There are three varieties of this species, distinguished by the undulations or spots on the fur.

A. Franklinii, Sabine. Head broad; ears small; snout blunt; tail elongated; body variegated, fuscous. Canada.—*Lin. Trans.* xiii. t. 27.

A. Richardsonii, Sabine. Ears short; snout acute; body fuscous. Canada.—*Lin. Trans.* xiii. t. 28.

A. Parryi, Richardson. Snout blunt; ears short; tail elongate, tip

black ; body marbled above with confluent black and white spots ; beneath ferruginous. One foot long ; tail four inches. Canada.
—*App. Franklin's Voy.*

- A. *tridecimlineata*, Harlan. (*S. tridecimlineatus*, Desm.) Fur deep-chestnut above, striped with six white lines, alternating with an equal number of longitudinal rows of white spots; white below.
—*Faun. Amer.* 164.

Gen. 106. SCIURUS, Lin. Cuv.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{4}-\frac{5}{4}=22$. Inferior incisors compressed laterally ; molars tubercular ; body elongated ; head small ; ears erect, rounded ; eyes large ; fore-feet with four long toes with compressed crooked nails and a tubercular thumb ; hind-feet very large, with five toes ; tail long, often with hair disposed in two rows ; two pectoral and six ventral mammæ.

* *Tail distichous.*

- S. vulgaris*, Lin. The Common Squirrel. Fur reddish above, white below ; ears pencilled with long hairs.—Europe and North of Asia.

Several varieties of the squirrel have been noticed, varying in different shades of colour and markings from fawn-colour to black. The colour sometimes changes with the season.—*Buff.* vii. pl. 32.

- S. Alpinus*, F. Cuv. Fur deep brown, varied with yellowish white above, white beneath ; feet yellow, with a yellow band separating the white of the neck and the gray of the limbs from the brown of the back ; ears pencilled. Pyrenees.—*F. Cuv. Mam.*

- S. cinereus*, Desm. The Gray Squirrel. Fur ash-coloured, white below ; ears without pencils of hair. Ten inches long. N. America.—*Shaw.* ii. pl. 147.

Var. With a red line on the back. *S. rubrolineatus*, Desm.

- S. capistratus*, Bosc. Body ashy ; head black ; muzzle, ears, and belly white. S. Carolina.—*Brown, Illust.* pl. 47.

Var. A.—Colour all black. Var. B.—With a black belly. Var. C.—Variegated with red, orange colour, and white.

- S. rufiventer*, Geoff. Fur gray above, bright red below ; feet brown ; tail shorter than the body. Size of the European Squirrel.—North America.

- S. Ludovicianus*, Curtis. Body and upper part of the tail dark gray ; belly, legs, thighs, and under part of tail reddish brown : tail longer than the body, very broad. N. America —*Barton's Journal*, vi. 47.

- S. grammurus*, Say. Body cinereous ; fur very coarse ; three black lines on each side of the tail. N. America.—*Say and Long*, vi. 72.

- S. lateralis*, Say. Fur brownish cinereous above ; sides marked with dull yellowish stripes. N. America.—*Say and Long*, vi. 46.

- S. quadrivittatus*, Say. Head brownish, with four white lines ; sides fulvous, whitish beneath. N. America.—*Say and Long*, vi. 45.

- S. magnicaudatus*, Harlan. Fur mixed gray and black ; sides of the head and orbits pale ferruginous ; tail large. Canada.—*Faun. Amer.* 178.
- S. Clarkii*, Griff. Fur silvery gray above ; shoulders, flanks, and belly white, with an ochry tint ; tail flat, terminating in a point. N. America.—*Griff. Syn.* 255.
- S. maximus*, Desm. Upper part of the head, flanks, and legs purple chestnut colour, with a black transverse stripe on the shoulders ; lower part of the back, loins, and tail black ; under part of the body and interior of the limbs pale yellow. Fifteen inches long. Malabar.—*Shaw*, ii. pl. 146.
- S. Ceylonensis*, Desm. Fur black above, yellow below ; tail gray. Ceylon.—*Penn. Ind. Zool.* pl. 1.
- S. Madagascariensis*, Shaw. Fur deep black above ; throat and belly yellowish-brown ; tail black. Eighteen inches long. Madagascar.—*Buff. Supp.* vii. pl. 63.
- S. Prevostii*, Desm. Fur black above, yellow on the flanks, chestnut below ; tail brown.—India.
- S. Leschenaultii*, Desm. Fur clear brown ; head, throat, and belly yellowish white ; tail brown above, yellowish below. About a foot long. There is a darker coloured variety. Java.—*Mam.* 335.
- S. bicolor*, Desm. Fur deep brown or blackish above, clear fawn-coloured below ; eyes surrounded with a black circle ; ears not pencilled. Java.—*Schreb.* t. 216.
- S. bilineatus*, Geoff. Fur gray, with a longitudinal white line on each side. Seven inches long.—Java.
- S. affinis*, Raffles. Fur ash gray above, nearly white beneath, with a reddish brown line on each side. Sumatra.—*Lin. Trans.* xiii.
- S. nigrovittatus*, Horsfield. Fur gray brown above ; edges of the abdomen and circle round the eyes paler ; gray beneath, with a lateral black line ; tail longer than the body, annulated with black. Java.—*Zool. Jav.*
- S. tenuis*, Horsfield. Fur variegated with deep-gray and black ; lateral edge gray, yellowish gray below ; tail annulated with black. India.—*Zool. Jav.*
- S. Finlaysonii*, Horsfield. Fur milk white ; back yellowish ; eyes, whiskers, and soles of the feet black. Java.—*Horsf. Zool. Jav.*
- S. getulus*, Desm. Brown above, with four longitudinal white lines reaching to the tail. Five inches long. N. Africa.—*Shaw*, ii. pl. 148.
- S. palmarum*, Desm. Fur gray brown, with three longitudinal bands of a pale white, the two lateral terminating at the eyes. India.—*Buff.* x. pl. 26.

* * Tail round, distichous only at the extremity.

- S. æstuans*, Desm. Fur olive gray above, reddish beneath ; tail

round, longer than the body, shaded with brown black and yellow. Nine inches long. Brazil.—*Shaw*. ii. pl. 156.

S. pusillus, Desm. Fur gray olive brown above, paler below ; tail round, shorter than the body. Cayenne. Four and a-half inches long.—*Shaw*, ii. pl. 156.

S. albovittatus, Desm. Fur reddish above, with a white line on each side ; tail round at its base, distichous at the extremity, and varied with black and white ; nails long, compressed. One foot long. Cape of good Hope.—*Sonnerat*, *Voy.* ii. t. 89.

S. bivittatus, Desm. Fur of a brown black, spotted with yellowish on the back, and a brilliant red below ; a white and black line meeting on each flank ; tail round, the termination red. A little larger than the common squirrel. Sumatra.—*Lin.* *Trans.* xiii.

S. annulatus, Desm. Fur greenish gray above, white below ; tail longer than the body, annulated with black and white.—*Mam.* 546.

*** *With cheek-pouches, tail distichous.*

S. striatus, Desm. Fur brown above, with five longitudinal brown stripes, and two white ones ; whitish below ; tail blackish above, red, bordered with black below. Southern Asia.—*Buff.* x. pl. 28.

S. Hudsonius, Desm. Fur of a reddish brown above, whitish ash-coloured below, with a black line on each flank.—*Penn. Syn. Quad.* t. 26, fig. 1.

Several other species of *Sciurus* have been noticed ; but as their characters are not well established their names are merely given.—*S. Persicus*, *anomalus*, Gmel. ; *erythræus*, Horsf ; *Abyssinicus*, *Indicus*, and *flavus* ; the Plantain Squirrel of Pennant ; the Mexican Squirrel of Seba ; and Rafinesque has described five North American species, viz. *S. ruber*, *Felenus*, *Phaiopus*, *Melanotus*, and *lateralis*,

Gen. 107. PTEROMYS, Cuv. Desm.—*Sciurus*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{4}-\frac{5}{4}$, = 22. Head round ; ears rounded ; eyes large ; fore-feet with four elongated toes with compressed sharp claws and the rudiment of a thumb ; hind-feet with five toes much divided ; tail long, hairy, sometimes distichous ; skin of the sides extended, forming a kind of parachute.

* *With round tail, hairs not distichous.*

P. petaurista, Desm. (*S. petaurista*, Pall.) The Sailing Squirrel. Fur brown, tipped with white above, whitish gray below ; thighs red ; feet brown ; tail blackish. Seventeen inches long. E. Indies.—*Shaw*, ii. pl. 152.

P. nitidus, Desm. Fur deep-chestnut above, brilliant red below ; tail deep brown. Size of the preceding. Java.—*Mam.* 342.

** *With flattened tails, hairs distichous.*

P. sagitta, Desm. Fur of a deep-brown above, white beneath ; tail bright brown, as long as the body. Six inches long. Java.—*Shaw*, ii. 151.

- P. Sibiricus*, Desm. (*S. volans*, Lin.) The Flying Squirrel. Fur ashy-gray above, white below; tail half the length of the body. About six inches long. There is a white variety. Northern Europe.—*Shaw*, ii. pl. 149.
- P. volucella*, Desm. Fur of a reddish gray above, white below; tail nearly as long as the body. About five inches long. United States.—*Shaw*, ii. 150.
- P. genibarbus*, Horsf. The Kechubu. Fur gray above, white beneath; vibrissæ on the cheeks and sides of the head, tail flat and distichous. Java.—*Griff. An. King. Syn.* 261.
- P. lepidus*, Horsf. Fur blackish brown, white beneath; head and middle of back gray; tail longer than the body, flat; ears naked; vibrissæ very large.—*Griff. An. King. Syn.* 261.

Section 2.—*With incomplete clavicles or none.*

Gen. 108. HYSTRIX, Lin. Cuv.—*Coendu*, Lacep.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4}$, = 20. Molars with flat crown, but with ridges of enamel; head strong; muzzle gibbous; ears short, rounded; tongue with spiny scales; fore-feet with four toes, and a rudimentary thumb; hind-feet pentadactyle; spines more or less long on the body, sometimes intermixed with hairs; tail sometimes prehensile.

M. F. Cuvier has divided this genus into five *genera*; but as the species bear no comparison to this excessive subdivision, no confusion can arise from retaining the old name.

H. cristata, Lin. Crested Porcupine. With very long spines on the back, annulated with black and white; a mane of long stiff hairs on the head and neck; tail short. About two feet long. Africa.—*Shaw*, ii. pl. 122.

The Porcupine burrows in the ground, and feeds on vegetable substances, coming out at night to feed. When it is irritated, it erects the spines on its body, rattles those on its tail, and strikes with its feet on the ground like hares and rabbits. Its voice resembles the grunting of a pig. Its flesh is eaten.

H. dorsata, Desm. Spines short, partly concealed in the brown hair; tail elongated; no mane; hair on the head and neck long. Two feet long. Canada.—*Shaw*, ii. pl. 125. Type of M. F. Cuvier's genus *Erethizon*.

H. fasciculata, Lin. (*Mus fasciculatus*, Desm.) Spines like strips of parchment: those on the body flat, black. Less than the common porcupine. Inhabits India. This is the type of M. F. Cuvier's genus *Acanthion*.—*Shaw*, ii. pl. 124.

H. Javanica. (*H. longicauda*, Marsden.) Like the last, but the tail shorter. Sumatra.—*Marsden, Sum. t.* 17,

H. macroura, Gmel. (*Mus macrourus*, Desm.) Upper part of the body covered with strong rounded spines; tail half the length of the body, tufted with spines formed like grains of rice. India.—*Shaw*, ii. pl. 124.

- H. spinosa*, Griff. Spines rather long, dark at the end; tail naked beneath. Paraguay.—Type of M. F. Cuvier's genus *Sphiggurus*.
- H. villosa*, Griff. Spines hid in the long thick hairs.—Brazil.
- H. Couiy*, Desm. (*H. prehensilis*, var γ Gmel.) Body covered with numerous short spines, yellowish at their base and point, brown in the middle; tail thick, pretty short, the latter half naked.—Mexico.
- H. Cuandu*, Desm. (*H. prehensilis*, Shaw.) Body covered with short spines, annulated black and white, without any mixture of hair in the upper part; tail nearly the length of the body, pointed and prehensile. Two feet long. Brazil.—*Shaw*, ii. pl. 123.—The type of M. F. Cuvier's genus *Sinæthere*.

Gen. 109. LEPUS, Lin. Cuv. Geoff, &c.

Incisors $\frac{4}{2}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{6}{5}$ — $\frac{6}{5}$ = 28. Centre upper incisors large and wedge-shaped, with a longitudinal furrow in front, lower incisors square; molars crowned with transverse laminæ of enamel; ears and eyes large; fore-legs short, with five toes; the hind-feet long, with only four, covered with hair; tail short, erect; teats from six to ten; cœcum very large.

L. timidus, Lin. The Hare. Fur brownish-red gray; chin and belly white; ears black at the point; tail white beneath, black above. Nearly two feet long. Europe. B.—*Shaw*, ii. pl. 162.

L. variabilis, Pall. Fur fawn-coloured in summer, white in winter; ears shorter than the head, and black at the tip at all seasons. Larger than the common hare. Mountainous parts of Europe and Asia. B.—*Penn. Quad.* t. 96, fig. 1.

L. glacialis, Sabine. The Snowy Hare. Fur white; ears black at the tip, longer than the head; nails strong, broad and depressed. Larger than the preceding.—Inhabits within the Arctic Circle.

L. cuniculus, Lin. The Rabbit. Fur gray, mixed with yellowish; reddish about the neck and belly; tail white, brown above. Fifteen inches long. Originally from Africa and Spain. B.—*Shaw*, ii. 162. There are numerous varieties of this species in colour and markings.

L. Tolai, Pall. Fur gray, mixed with brown and yellow; belly white; feet yellowish; ears a little longer than the head in the males, shorter in the females. Mongolia and Tartary.—*Pall. Glir.* t. 4, fig. 2.

L. Ægyptius, Geoff. (*Lepus Capensis*, Lin.) Fur reddish-brown; breast and feet red fawn-colour; tail black above, white below; ears longer than the head, black at the tip. Fifteen inches long. Inhabits Africa.—*Geoff. Egyp.*

L. Americanus, Desm. Fur yellowish gray, varied with brown;

- throat and belly white ; ears shorter than the head, without black tips. Size of the rabbit. N. America.—*Schreb.* 234, B.
- L. Braziliensis*, Lin. Fur brown and yellowish above ; a half collar of white on the throat ; ears much shorter than the head. South America.—*Marcg. Braz.* 223.
- L. nigricollis*, F. Cuv. Head sprinkled with yellow ; sides red ; throat white ; a grayish white band from the muzzle to the ear ; upper part and sides of neck and shoulder bright black.—Java.
- L. saxatilis*, F. Cuv. Fur reddish-gray, under parts white ; ears red behind, black brown at the tips.—Cape of Good Hope.

Gen. 110. LAGOMYS, Geoff. Cuv.—*Lepus*, Pall.

- Incisors $\frac{4}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{6}{3}-\frac{6}{3} = 28$. Teeth and toes similar to the hare ; ears short, rounded ; no tail ; clavicles almost perfect ; teats four or six.
- L. alpinus*, Pall. Fur reddish ; ears and soles of the feet brown. Northern mountains of the Old World. Ten inches long.—*Shaw*, ii. pl. 163.
- L. ogotona*, Pall. Fur pale gray ; ears oval, slightly pointed, the colour of the body. Seven inches long. Mongolian Tartary.—*Shaw*, ii. pl. 163.
- L. pusillus*, Desm. (*Lepus pusillus*, Pall.) Fur gray brown ; ears almost triangular, edged with white. Seven inches long. S. E. parts of Russia.—*Shaw*, ii. pl. 163.

Gen. 111. HYDROCHÆRUS, Cuv.—*Sus*, Lin.—*Cavia*, Pall.

- Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{4}-\frac{5}{4} = 22$. Molars composed of laminae ; eyes large ; ears rounded ; fore-feet with four, the hinder ones with three, palmated toes ; no tail ; two mammae ; hair scattered and bristly.
- H. capybara*, Desm. (*Cavia capybara*, Gmel.) Fur reddish brown, fawn-coloured below ; head very large. Nearly three feet in length. Inhabits South America.—*Shaw*, ii. pl. 127.

Gen. 112. CAVIA, Desm.—*Mus*, Lin.—*Cobaya*, Cuv.

- Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4} = 20$. Body thick ; muzzle short, compressed ; eyes large ; ears round ; legs short ; four toes on the fore-feet, three on the hind-feet, not palmated ; no tail ; two ventral teats.
- C. cobaya*, Desm. The Guinea Pig. Fur reddish-gray in the wild variety, or varied with black, yellow, and white in the domestic races. Nearly a foot long. Brazil, &c.—*Shaw*, ii. pl. 126.

Gen. 113. DASYPROCTA, Illig.—*Mus*, Lin.—*Cavia*, Gmel.

- Incisors $\frac{2}{2}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{4}{4}-\frac{4}{4} = 20$. Head rather elongated, forehead flat ; muzzle thick ; eyes large and pro-

jecting ; fore-feet with four toes and rudimentary thumb ; hind-legs longer than those before, with three toes and strong nails ; sole of the foot naked and callous.

D. Acuti, Desm. The Agouti. Fur brown, sprinkled with yellow or reddish ; ears short ; tail rudimentary ; twelve teats. Nearly two feet long. Brazil.—*Shaw*, ii. pl. 126.

D. cristata, Desm. Fur blackish, sprinkled with red ; hair on the occiput long, and forming a sort of crest ; hair on the croup also long ; belly brown ; ears and tail short.—*Mam.* 358.

D. Acuschy, Desm. The Akouchy. Fur brown, spotted with yellow ; croup blackish ; belly red. Twenty inches long. Guiana.—*Shaw*, ii. pl. 126.

D. Patagonica, Desm. Fur brownish gray, dotted on the back, black on the croup, white on the thighs and belly ; tail very short. Two feet six inches long. Patagonia.—*Shaw* ii. pl. 165.

D. Viscacha, Desm. Fur dirty white ; sides of the head black ; moustache seven inches long ; body thick and cylindrical ; tail naked at tip, but with bristly hairs on the upper part of the remainder. As big as a hare ; tail nine inches long.—Brazil.

Gen. 114. CÆLOGENUS, F. Cuv.—*Cavia*, Lin.

Incisors $\frac{2}{2}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{4}{4}$ — $\frac{4}{4}$ = 20. Five toes on all the feet, the external and internal toe behind being nearly rudimentary ; nails conical, strong, for digging ; cheek-pouches ; a naked tubercle in place of a tail ; two pectoral and two inguinal mammæ.

C. subniger, Desm. The Brown Paca. Fur short, blackish-brown, marked on each flank with four or five longitudinal bands of white spots ; head large ; neck short ; ears round. Twenty-one inches long. S. America.—*Buff. Sup.* iii. pl. 35.

C. fulvus, Desm. (*Cavia paca*, Geoff.) Like the preceding, but with the ground colour yellowish. S. America.—*An. Mus.* x. pl. 9.

ORDER VII.—EDENTATA.

No incisors in either jaw ; sometimes canines and molars, or molars only, often no teeth at all ; extremities terminated with toes in number variable, armed with strong nails ; orbital and temporal fossæ united.

The Edentata are quadrupeds without incisive teeth, and form the last order of ungulated animals. Although united together only by a negative character, they possess some positive connection in the large nails which cover the extremities of the toes, which approach more or less to the nature of hoofs, and a want of agility, a certain slowness of motion, occasioned by the disposition of their members.

1st TRIBE.—TARDIGRADA.—*Face short ; with canine and molar teeth, or molars only ; nails long and bent.*

Gen. 115. BRADYPUS, Lin. Cuv.

Incisors $\frac{0}{0}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, molars $\frac{4}{3}$ — $\frac{4}{3}$ = 18. Canines higher than the molars, pyramidal and pointed ; molars cylindrical ; head small, rounded ; muzzle truncated ; neck short ; nostrils at the extremity of the muzzle ; anterior extremities longer than the posterior, with two or three united toes, terminated by very long robust nails ; fur thick and harsh, with the hair of the fore-arms directed upwards ; stomach membranous, divided into many sacs ; intestines short ; no cœcum.

B. tridactylus, Lin. The Three-toed Sloth. Three nails to all the feet ; lower jaw truncated before ; fur of a gray, more or less brown, mixed with whitish ; soles of the feet hairy. S. America.—*Shaw*, i. pl. 45.

The extreme slowness of locomotion in the Sloth is the result of its peculiar conformation. It possesses, however, a great degree of muscular power, and will hang for days upon trees with its body downward by its strong claws. It feeds upon the leaves, buds, and fruits, and never leaves the tree upon which it is located till the supply is completely exhausted ; then rolling itself up as a ball the animal drops to the ground, and drags itself heavily along in search of fresh food. The apathy of these animals is such that they may be taken attached to the branch of the tree upon which they are found, and testify neither astonishment nor uneasiness at any treatment they may receive. They emit a plaintive cry, noted by the vowels *a*, *i*, from whence the American name, *Ai*.

B. didactylus, Lin. Two long nails only on the fore-feet ; lower jaw projecting and pointed ; hair very long, of a brownish gray colour ; soles of the feet naked. S. America.—*Shaw*, i. pl. 46.

Gen. 116. MEGATHERIUM, Cuv. (*Fossil*.)

Incisors $\frac{0}{0}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{4}{4}$ — $\frac{4}{4}$ = 16.

M. Cuvieri. Molar teeth marked with transverse furrows on the crown. Body, estimated from the skeleton, 12 feet long.—Found in Paraguay, South America.

2d TRIBE.—EFFODIENTIA.—*Muzzle elongated ; with molar teeth only, or none at all.*

Gen. 117. DASYPUS, Lin.—*Armadillo*, Briss.

Incisors $\frac{0}{0}$ or $\frac{2}{4}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars varying in the several species from 28 to 68, simple, cylindrical, separate, without enamel on the inner side ; head long, mouth and eyes small ; body enveloped in a hard scaly shell in three compartments, covering the head, the body, and the tail, with moveable transverse bands between them ; five toes on the hind-feet, four or five on the fore-feet, with long nails for digging.

* *Four toes on the fore-feet ; two or four mamma.*

D. Apar, Desm. (*Dasypus tricinctus*, Lin.) The Three-banded Ar-

madillo. Molars $\frac{3}{8}$ — $\frac{3}{8}$; tail short, flattened; three moveable transverse bands to the body; two pectoral mammæ. Rolls itself into a ball. Inhabits South America.—*Shaw*, i. pl. 57.

The *D. quadricinctus* of Linnæus, and the *Armadillo Indicus* of Brisson, appear to be allied to this species, which M. F. Cuvier makes the type of his genus *Tatusia*.

D. Peba, Desm. (*D. novemcinctus*, Lin.) The Nine-banded Armadillo. Molars $\frac{3}{8}$ — $\frac{3}{8}$; tail round, almost as long as the body, annulated nearly its whole length; body with seven, eight, or nine mobile bands; plates of the shield small, rounded, those of the bands rectangular; ears very long; four teats. Two feet long. Inhabits Brazil, &c.—*Shaw*, i. pl. 57.

D. hybridus, Desm. Tail round, nearly half as long as the body; muzzle elongated; ears large; legs short; shield with five, six, or seven moveable bands. About a foot long.—Inhabits Brazil.

* * Five toes on the fore-feet, and two pectoral mammæ.

D. giganteus, Desm. Molars $\frac{17}{17}$ — $\frac{17}{17}$; tail round, half as long as the body, covered with plates; shield with 12 or 13 bands, composed of long scales; ears small; head gibbous; muzzle long; claws very strong. Three feet long. Paraguay.—*Shaw*, i. pl. 59.

D. Tatouay, Desm. The Twelve-banded Armadillo. Molars $\frac{3}{7}$ — $\frac{3}{7}$; tail round, less than half the length of the body, covered with scattered tubercles; shield with 12 or 13 moveable bands, formed of broad rectangular plates; ears large; muzzle long. Eighteen inches long. Inhabits Brazil.—*Schreb.* t. 75.

D. sexcinctus, Desm. Incisors $\frac{2}{4}$, molars $\frac{3}{8}$ — $\frac{3}{8}$; six or seven moveable transverse bands; tail round, half as long as the body. Inhabits Paraguay.—*Shaw*, i. pl. 58.

D. villosus, Desm. Hairy Armadillo. Molars $\frac{3}{8}$ — $\frac{3}{8}$; tail half as long as the body, annulated at the base; shield edged with serrated scales, furnished with six or seven moveable bands of rectangular plates; hair brown, abundant. Fourteen inches long.—Inhabits South America.

D. minutus, Desm. Tail round, annulated at the base, nearly half as long as the body; shield notched on the sides, with six or seven bands of rectangular plates; bands dentated on their margin. Ten inches long. Buenos Ayres.—*F. Cuv. Mam.* i.

Gen. 118. ORYCTEROPUS, Geoff. Cuv.—*Myrmecophaga*, Pall.

Incisors $\frac{0}{0}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{6}{6}$ — $\frac{6}{6}$ = 24. Molars separate, without root or distinct crown, formed of bony substance, traversed longitudinally by parallel tubes; head elongated; four toes before, and five behind, the hind-feet plantigrade; nails very thick, approaching to hoofs.

O. Capensis, Desm. (*Myrmecophaga Capensis*, Gmel.) Fur pale gray, inclining to red on the flanks. Three feet five inches long. Inhabits Cape of Good Hope.—*Griff. An. King.* iii. 296.

Gen. 119. MYRMECOPHAGA, Lin. Cuv. Desm. &c.

Perfectly toothless; head elongated; muzzle tapering to a point; tongue long, protractile; toes united, four before and five behind, or two before and four behind, armed with strong nails; two pectoral and two ventral mammae; tail long, sometimes prehensile.

M. jubata, Lin. The Great Ant-eater. Fore-feet with four toes; hind-feet with five; tail not prehensile, with long hair; fur brown, with an oblique black line on the shoulders. Four feet long. Inhabits South America.—*Shaw*, i. pl. 49.

M. Tamandua, Desm. (*M. tridactyla*, Lin.) Four toes before, five behind; tail round, naked at its point, prehensile; fur varying much in colour, but mostly pale gray, with a band on the shoulders. Two feet long. Inhabits South America.—*Schreb.* t. 66.

Var. A. Yellowish gray.—Var. B. With black before the eyes.—Var. C. Dirty yellow, with a brown line on the shoulders.—Var. D. Of the same colour, but with the croup, flanks, belly, and shoulders brown.—Var. E. Uniformly yellow.—Var. F. Black.—Var. G. Pale yellow, sides and croup brown.—Var. H. With an annulated tail, *M. annulata*, Desm.—Var. I. With a triangular brown spot above the eyes; tail annulated.

M. didactyla, Lin. Desm. Only two nails on the fore-feet, one of which is very large; four on the hind-feet; tail long and prehensile, naked below at the extremity; fur fawn-coloured, woolly, with a reddish dorsal line. Seven inches long. S. America.—*Shaw*, i. pl. 52.

Gen. 120. MANIS, Lin. Cuv. Geoff.

Entirely toothless; body elongated, covered with strong corneous triangular and imbricated scales, and capable of rolling into a ball; muzzle long; tongue protractile; feet with five toes formed for digging; tail long.

M. crassicaudata, Geoff. (*M. macroura*, Desm.) The Short-tailed Manis. Tail shorter than the body, thick at the base; scales of the back forming eleven longitudinal rows. Nearly two feet long. Inhabits the India Islands.—*Shaw*, i. pl. 56.

M. longicaudata, Geoff. (*M. Africana*, Desm.) Long-tailed Manis. Tail twice the length of the body, turned upward, compressed; eleven rows of longitudinal scales. Smaller than the preceding. Inhabits Central Africa.—*Shaw*, i. pl. 55.

M. Javanicus, Desm. Tail a little shorter than the body, depressed; 17 longitudinal rows of scales on the back. 16 inches long.—Java.

Gen. 121. CHLAMYPHORUS, Harlan, Griff.

Incisors $\frac{0}{0}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{3}{3}$ — $\frac{3}{3}$, the two first pointed, the rest flat and cylindrical; shell composed of a series of transverse plates; toes, five before and behind, with compressed nails; tail short, turned downwards.

C. truncatus, Harlan. Body covered with a leather-like shell.

abruptly truncated behind, with white silky hair beneath. Five inches long. Inhabits North America.—*Zool. Journ.* ii.

3d TRIBE.—MONOTREMA. *Mammæ not observed; marsupial bones.*

Gen. 122. ECHIDNA, Cuv. Geoff.—*Myrmecophaga*, Shaw.

Toothless, but the palate aculeated; head small, conical; muzzle prolonged; tongue protractile; eyes very small; no external ears; feet short, with five toes; and a moveable spur on the inner side of the hind-legs of the male, through which an acrid fluid is ejected; tail short; body covered with spines; large marsupial bones; body capable of a spherical shape.

E. hystrix, Desm. (*Myrmecophaga aculeata*, Shaw.) Spiny Echidna. Body covered with thick spines, without a mixture of hairs. Size of a hedgehog. New Holland.—*Shaw*, i. pl. 54.

E. setosa, Desm. Bristly Echidna. Body covered with hair, among which are found short spines. A little larger than the preceding. New Holland.—*Home, Phil. Trans.* 1802. pl. 13, B.

Gen. 123. ORNITHORYNCHUS, Blumenbach,—*Platypus*, Shaw.

Incisors $\frac{0}{0}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{2}{2}$ — $\frac{2}{2}$, = 8. Molars fibrous, fixed only in the gum; a horny beak resembling a duck's bill; nostrils contiguous, opening at the end of the upper mandible; cheek-pouches; feet webbed, pentadactyle, with a spur on the hind ones in the male; tail short, broad at its base.

O. rufus, Desm. (*O. paradoxus*, Blum.) Fur reddish brown above, silvery white below. 14 inches long. New Holland.—*Shaw*, i. pl. 66.

O. fuscus, Desm. Fur blackish brown; hair flat and curled. Size of the preceding. Inhabits New Holland.—*Leach, Zool. Mis.* t. 111.

ORDER VIII. PACHYDERMA.

Three or two kinds of teeth; four extremities, with the toes variable in number, and furnished with strong nails or hoofs; no clavicles; organs of digestion not disposed for ruminating.

Unable to use their feet for the purpose of seizing objects, this Order commences the series of hoofed quadrupeds. Their feet serving only as means of support, they possess no clavicles, their fore-arm remains always in a state of pronation, and they are thus necessarily reduced to feed on vegetables. Their forms and their modes of life present fewer varieties than those of the ungulated animals; and Cuvier has accordingly arranged the whole series in two Orders—those which ruminate and those which do not. The last of those, or Pachyderma, including the largest terrestrial animals, form two families.

FAMILY I.—PROBOSCIDEA.

Upper incisors in form of elongated tusks; molars compound

and in small number; five toes on all the feet; nose prolonged into a proboscis.

Gen. 124. *ELEPHAS*, Lin. Cuv. Geoff. Desm.

Incisors or tusks $\frac{2}{0}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{2}{2}-\frac{2}{2}$, = 10. Tusks slightly arched toward their extremity, composed of ivory, cased in a crust of enamel; molars composed of vertical and transverse laminae covered by enamel; five toes on all the feet; nose elongated into a cylindrical proboscis, moveable in all directions, with a moveable appendix at the termination, serving the purpose of a finger; head very large; neck short, eyes small, lateral; ears extremely flat, and very large; body large and massive; tail short, tufted at the end; two mammae.

The Elephant is the largest of existing quadrupeds, and has been known from the earliest ages. The Asiatic species is found throughout the whole of Southern India and the neighbouring islands; but though extensively employed it can scarcely be considered as a domestic animal, as it does not breed in captivity. The supply is therefore kept up by the capture of wild ones, and elephant-hunting forms a princely sport among the inhabitants of Asia. The elephant inhabits forests in the neighbourhood of rivers, and swims with great ease. It is a gregarious animal, and is generally found in herds, sometimes to the amount of hundreds together. Its extreme docility renders it easy to be tamed; and numerous facts have been related of its sagacity in a state of domestication. The specimen long in Mr Cross's collection at Exeter Change, and which he was forced to kill to preserve the building, was between 10 and 11 feet in height, and weighed by computation between four and five tons. Its daily allowance of food was three trusses of hay, about 200 lbs of carrots and other fresh vegetables, and from 60 to 80 gallons of water. A strong elephant can carry 2000 pounds weight and travel 60 miles a-day; though in long marches its feet are apt to become tender. The period of gestation is twenty months. At birth the young elephant is about three feet long, and it sucks with its mouth, putting back the proboscis when doing so. It arrives at full growth in about twenty years; and lives, according to the opinion entertained in India, for three centuries, witnessing the successive rise and decay of the ephemeral generations of men. The tusks, an object of commerce, are changed but once during the life of the animal, but the molar teeth are renewed as often as detrition renders it necessary. These teeth, however, are not renewed in the usual manner, by the new teeth pushing out the old ones, but by a lateral succession from back to front. The most wonderful part of the structure of the elephant is its proboscis, which to it serves all the purposes of a hand; and while it is able with this powerful instrument to lift the greatest weights, its lip possesses all the delicacy of a finger, and is capable of seizing the smallest substances.

E. Indicus, Cuv. (*E. maximus*, Lin.) The Asiatic Elephant.

Head oblong; forehead concave; ears large, but less than those of the African species; four hoofs on the hind-feet; crown of the molar teeth marked by transverse undulating lines of enamel. Height about ten feet. Inhabits Southern Asia and the larger Islands.—*Shaw*, i. pl. 63.

Var. The white Elephant. This variety is rare, and is held in much esteem by the eastern sovereigns. Horace alludes to its exhibition in ancient Rome, Epist. i. B. ii.

E. Africanus, Cuv. Desm. The African Elephant. Head round, forehead convex; ears very large; three hoofs to the hind-feet; crown of molar teeth marked by lozenge-shaped lines of enamel. Smaller than the Asiatic species. This is probably the elephant of the Greeks and Romans.—*Griff. An. King*. iii. 349.

E. primogenius, Blumen. The Mammoth, Cuv. (*fossil species*.)

Head oblong; forehead concave; tusks very large; molar teeth with close parallel ridges of enamel. Larger than the Indian elephant. Found fossil in Northern Europe.—*Cuv. Ossem. Foss.* 2d edit. i. p. 75, pl. 11.

An individual of this species discovered in Siberia, with the flesh and skin entire, upon the melting of the ice in a hot summer, was found covered with two kinds of hair, viz. a red and thick tufted wool, and stiff black bristles upon the neck and spine, that upon the neck long enough to have formed a kind of mane. From this circumstance, and the numerous remains of fossil elephants found all over Europe, M. Cuvier conceives it to be probable that this species has formerly existed there, its covering of hair protecting it from the rigours of a northern winter. Other isolated bones, from having the remains of marine animals attached to their surface, seem to imply that they had been exposed to the action of the sea.

Gen. 125. MASTODON, Cuv. (*Fossil.*)

Incisors $\frac{2}{0}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{2}{2}-\frac{2}{2}$, = 10. Molar teeth rectangular, without cortical substance, the crown with points disposed in pairs, of which the number varies.

M. giganteum, Cuv. Mammoth of the Americans. Molars very broad relatively to their length, the crown presenting, when its points have been worn down by use, lozenges of enamel. Height to the withers 11 feet; tusks nine feet long; molar teeth weighing 11 or 12 lbs.—Fossil in N. America.

M. angustidens, Cuv. Molars narrow and elongated, their crown by use presenting discs of enamel of a trefoil form. A third less than the gigantic Mastodon.—Found fossil in the South of Europe, and at Santa Fe de Bogota, 1300 toises above the level of the sea.

M. Cordillerarum, Cuv. Intermediate molars as large as those of the great Mastodon, with crown nearly square, and trefoil-shaped discs of enamel.—Found fossil in S. America by Humboldt.

M. Humboldtii, Cuv. Intermediate molar tooth a third smaller than those of the great Mastodon, covered with trefoil-shaped discs.—Found fossil in Chili.

M. minus, Cuv. Intermediate molar tooth narrow and elongated, with trefoil-shaped discs. A third smaller than the *Mastodon angustidens*.—Found fossil in Saxony.

M. tapiroides, Cuv. Intermediate molar tooth with eminences crenulated at their summit, and scarcely perceptibly divided into two parts.—Found fossil near Orleans.

FAMILY II.—PACHYDERMA, *properly so called.*

Three kinds of teeth in the greater number; two at least in the others; feet terminated by four or two toes.

1st Division.—*With the toes equal.*

Gen. 126. HIPPOPOTAMUS, Lin. Cuv. Desm. Geoff.

Incisors $\frac{4}{4}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7}$ = 40. Lower canines much developed, forming strong tusks curved upwards; head

thick and square ; muzzle very large and gibbous ; body very thick and heavy ; legs short, with four toes on the feet ; eyes and ears small ; tail short ; two ventral mammae ; skin very thick, almost without hair.

The Hippopotamus is one of the largest of quadrupeds, reaching to twelve feet long, and from five to six in height. Its body is very massive, and denuded of hair ; its legs short, the belly almost touching the ground, and the head excessively large. It inhabits the muddy banks of rivers, which it quits in the night in search of pasture, and at the least noise or indication of danger dives to the bottom of the water, from time to time raising itself to the surface to breathe. The hippopotami are gregarious in their habits, and are found throughout Africa. Anciently they were common in Egypt, and the latter Roman Emperors often brought them to Rome, and exhibited them in the Circus. The skin is very thick, and is cut into strips at Senaar, where they are numerous, and made into whips. The flesh is eatable, and the fat thought a delicacy by the colonists at the Cape. The name of the River Horse, which it has popularly received, seems not inapplicable, Mr Burchell conceives, when merely the upper part of the head is seen above the water ; but M. F. Cuvier conjectures that this ancient name has reference to its voice, which Adanson informs us is like neighing. The hippopotamus is alluded to in the Sacred Writings.—*Jab*, xl. 15.

H. amphibius, Lin. Body very massive ; belly almost touching the ground ; mouth much cleft ; ears far back. About 13 feet long. Inhabits the great rivers of Africa.—*Shaw*, ii. pl. 219.

Desmoulins has divided this species into two, *H. Capensis* and *H. Senegalensis*, distinguished by the character of the skulls of specimens from different parts of Africa.

H. antiquus, Cuv. (*fossil*.) Size of the preceding ; occiput very elevated.—Found fossil in Italy.

H. minor, Cuv. (*fossil*.) Adult individuals, as indicated by the state of the teeth, about the size of the wild boar.

H. medius, Cuv. Of a size intermediate between the two preceding ; last lower molar tooth one inch long ; the penult one 11 lines.—Found fossil in France.

H. minimus, Cuv. Size smaller than the *H. minor*.—Found fossil with the remains of crocodiles in limestone near Blaye, France.

Gen. 127. *Sus*, Lin. Cuv. Geoff. Desm.

Incisors $\frac{4}{6}$ or $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7} = 42$ or 44. Canines bent upwards and laterally ; molars tuberculous ; lower incisors bent forward ; four toes on all the feet, the two middle ones only touching the ground, armed with strong hoofs ; nose elongated, cartilaginous ; body covered with bristles ; twelve teats.

S. scrofa, Lin. The Hog. Tusks strong, triangular, directed laterally ; no protuberance under the eyes ; colour blackish gray in the wild animal, but varying much in the domesticated races.—Inhabits all the habitable world.

The English variety acquires an extraordinary bulk, and sometimes weighs 1200 lbs. It is generally of a whitish colour, and the body much elongated. The Jutland race has an elongated body and pendant ears, back bent, and limbs long. The Zealand race is smaller, and has the ears slightly raised, and the back furnished with strong bristles. The races of Poland and Russia are of a reddish colour ; and the South

of Europe possesses a black race with short limbs. The races of France have the bones generally small, and the head pointed ; and there is a solidungulous variety, but in which traces of the hoofs may be observed. There is, besides, the Turkish pig, the Siamese pig, and other varieties more or less characterized by family likenesses.

The fecundity of the hog is very great. A hog belonging to Mr Thomas Richdale, Leicestershire, had produced, in the year 1797, three hundred and fifty young ones in twenty litters ; four years before it brought forth two hundred and five in twelve litters ; and in Vauban's opinion in twelve generations the produce of a single pair would produce as many as Europe could support. Among the ancients the hog was in much esteem ; it was the peculiar sacrifice to Ceres ; and in the Island of Crete it was regarded as sacred. In ancient Rome the art of rearing and fattening them was much studied, and a dressed hog was among the most expensive of the imperial dishes. The Jews and Mahometans do not eat the flesh of the hog.

S. babyrussa, Lin. Tusks long, slender, turned up vertically ; the upper ones bent behind ; legs long. Inhabits India Islands.—*Griff. An. King.* iii. p. 408.

S. larvatus, Desm. Tusks moderate, angular and lateral ; a large fleshy tubercle on each cheek. Size of the European wild boar. Inhabits Madagascar.—*Schreb.* t. 327.

Gen. 128. PHASCOCHERUS, Cuv. Desm.—*Sus*, Lin. Geoff.

Incisors $\frac{2}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{4}-\frac{5}{4} = 30$. Tusks very strong, lateral, and directed upwards ; molars composed of cylinders of enamel, inclosing the osseous substance ; large warts on the cheeks ; toes like the hog.

P. Africanus, Desm. (*Sus Æthiopicus*, Lin.) Tusks rounded, very thick, directed laterally and vertically ; a large fleshy lobe on each cheek. Nearly five feet long. Africa.—*Griff.* iii. p. 410.

Gen. 129. DICOTYLES, Cuv. Desm.—*Sus*, Lin. Geoff.

Incisors $\frac{4}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{6}{6}-\frac{6}{6} = 38$. Canines or tusks not projecting from the mouth ; the other teeth like those of the hog ; four toes before, three behind, only two of which lean upon the ground ; a glandular opening on the back, from which exudes a fetid humour ; no tail.

D. torquatus, F. Cuv. Desm. The Peccari. Hair of the fur annulated with dirty white and black ; a large whitish oblique line descending from the shoulders over the sides of the neck. About two feet and a half long. S. America.—*Shaw*, ii. pl. 224.

D. labiatus, F. Cuv. Desm. Fur of a uniform blackish brown ; lips white. Three feet long. S. America.—*Griff.* iii. 413.

Cuvier has mentioned two genera of fossil quadrupeds, the *Chæropotamus*, the general form and size of the head of which is similar to the hog ; found in the gypsum quarries near Paris ; and the *Anthracotherium*, which includes a large species, of which the remains have been found at Genes.

Gen. 130. ANOPLOTHERIUM, Cuv.—(*Fossil.*)

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7} = 44$. Teeth all in one line ; general form intermediate between the rhinoceros and horse ; feet terminated by two toes ; molar teeth in crescent-formed lines or tuberculous.—*Oss. Foss.* 2d edit.

A. vulgaris, Cuv. Size of the ass.—Found fossil near Paris.

A. secundarium, Cuv. Size of the hog.

A. medium, Cuv. Size and form of the goat.

A. minus, Cuv. Size of the hare.

A. minimum, Cuv. Size of the Guinea pig.

2d Division.—*Toes always unequal in number on the hind-feet, and often on those before.*

Gen. 131. RHINOCEROS, Lin. Cuv. Desm.

Incisors $\frac{0}{0}$ or $\frac{2}{2}$ or $\frac{4}{4}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{7}{7}$ — $\frac{7}{7}$ or $\frac{6}{6}$ — $\frac{6}{6}$ = 32 or 36. Incisors unequal among themselves when they exist; anterior molars small, the posterior increasing progressively; eyes small, lateral; ears long, narrow; three toes on all the feet; one or two horns, placed on the nose, above the nasal cavity; skin very thick, naked, and rugous, tail short; laterally compressed.

R. Indicus, Desm. Cuv. (*R. unicornis*, Lin.) One horn on the nose; two strong incisors in each jaw, with a small tooth on each side of those in the upper jaw; skin forming several deep folds. Length upwards of ten feet. Inhabits India.—Griff. iii. 424.

The Rhinoceros with one horn, the unicorn of the Sacred Writings, and the type of the fabulous animal of heraldry, approaches to the elephant in size, and like it feeds on vegetable substances. Its body is heavy, and the skin, which is very thick, forms rugous folds in different parts. The knowledge of this circumstance among the older naturalists led them to multiply these folds, and to figure this animal completely encased in native armour. According to Mr Burchell, whose opportunities of examination were abundant, the horns of this genus do not envelope a bony core like those of the ruminating animals, nor do they partake of the osseous nature of the horns of stags, but appear to be formed of horny fibres, growing from the skin, like thick hairs closely cemented together. The smell of the rhinoceros is so keen that it can perceive at a great distance the approach of men, and it is only by advancing against the wind that the hunter can get within musket shot. Their power of hearing is equally acute. In a specimen lately exhibited in Britain, the colour of the nearly naked skin was gray with a violet tint, and under the folds of the skin flesh-coloured. He was habitually gentle, knew those who supplied him with food, and opened his mouth and put out his tongue for it. His long upper lip seemed peculiarly useful in collecting his food. He was about eight feet long.

R. Sondaicus, Cuv. One horn on the nose; skin rugous, covered with thinly scattered brown hairs; margin of the ears and tail with numerous short hairs. Nearly six feet long.—Sumatra.

R. Africanus, Desm. (*R. bicornis*, Lin.) Two horns upon the nose; no folds of the skin; no incisors in either jaw. About the size of the Indian species. Inhabits Southern Africa.—Shaw, i. pl. 61.

R. Sumatrensis, Cuv. Two horns on the nose; skin almost without folds; two incisors in each jaw. Sumatra.—Shaw, i. pl. 62.

R. Camus, Griff. Horns two; muzzle truncated; skin without folds. Nearly double the size of the common two horned rhinoceros of Africa. Southern Africa.—Burchell's Travels, ii. 75.

R. Pallassii, Cuv. (*fossil*.) Head elongated, supporting two long

horns; bones of the nose forming a large arch, consolidated by a vertical partition, which is wanting in the living species; body covered with thick hair. Size larger than the African rhinoceros.—Found fossil in Siberia, Germany, France, and England.

R. *Cuvieri*, Desm. (*R. leptorhinus*, Cuv.) Form approaching that of the African species; head with two horns. *Cuv. Reg. An.* i. 240.—Found fossil in Italy.

R. *minimus*, Cuv. About the size of the hog; incisive teeth in both jaws.—Found fossil in France.

Gen. 132. HYRAX, Hermann, Cuv. Geoff.—*Cavia*, Pall.

Incisors $\frac{2}{4}$, false molars $\frac{1}{0}-\frac{1}{0}$, molars $\frac{6}{8}-\frac{6}{8} = 32$. Two strong bent incisors in the upper jaw, and two very little canines in youth; four inferior incisors without canines; body covered abundantly with hair of two kinds, one woolly and short, the other long and silky; four toes on the fore-feet, and three on those behind; nails small, flat, and scarcely covering the upper part of the toes; head large; nostrils oblique; upper lip cleft; ears large and rounded; no tail; two pectoral and four ventral mammæ.

H. *Capensis*, Desm. Fur thick, of a grayish brown above, and whitish below. About two feet long. Inhabits the Cape of Good Hope.—*Shaw*, ii. pl. 164.

This singular little animal, the Coney of the Sacred Writings, inhabits holes in rocks, and feeds on vegetables, roots, and fruits. It is found in the neighbourhood of the Cape of Good Hope, in Abyssinia, and on Mount Libanus. The *H. Syriacus* of Gmelin does not seem to differ from the present species.

Gen. 133. PALÆOTHERIUM, Cuv.—(*Fossil*.)

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7} = 44$. Incisors ranged in the same line, wedge-shaped; canines conical, crossing each other; molars of a square form, separated from the canines by an empty space, with four roots, ridged with enamel; general form of the head like that of the tapir.—*Oss. Foss.*

* PALÆOTHERIA, proper.—*Inferior molars in double crescents.*

P. *magnum*, Cuv. Size of the horse.

P. *medium*, Cuv. Size of the hog; feet long and slender.

P. *crassum*, Cuv. Size of the hog; feet shorter and broader than the preceding.

P. *curtum*, Cuv. Size of a little sheep; legs very short and thick.

P. *minus*, Cuv. Size of a small sheep; legs slender.—All found fossil in the gypsum quarries near Paris.

** LOPHIODON.—*Inferior molars crowned with transverse eminences.*

L. *giganteum*, Cuv. Size of the rhinoceros. About eight feet long.—Found in the fresh water formations.

- L. tapiroides*, Cuv. Size of the ox.—Found in the fresh water formations.
- L. Buchsonvillanum*, Cuv. Size of the hog.—Found near Buchsweiler on the Lower Rhine.
- L. tapirotherium*, Cuv. Size of the tapir.—France.
- L. Aurelianense*, Cuv. Size of the hog. France, near Orleans.
- L. occitanicum*, Cuv. Size of the sheep.—Found fossil at Issel.

Gen 134. *TAPIRUS*, Cuv. Geoff.—*Hippopotamus*, Lin.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, molars $\frac{7}{7}-\frac{7}{7} = 44$. Intermediate incisors shorter than the exterior; nose terminating in a little moveable proboscis, but not by a kind of finger like the elephant; eyes small; ears long and moveable; fore-feet with four toes, the hind ones with three, with short round hoofs; tail very short; two inguinal mammæ.

T. Americanus, Desm. (*Hippopotamus terrestris*, Lin.) The Tapir. Fur brown or fawn-coloured; a little mane on the neck of the male. Nearly six feet long. S. America.—*Shaw*, ii. pl. 220.

The tapir sleeps during the day in the most sequestered places, and goes forth at night in search of water melons, gourds, and pasture. If taken young it may be almost immediately tamed, and, like the hog, will feed on any thing.

T. Malayanus, Raffles, (*T. Indicus*, Desm.) Fur black or dirty brown, with a large white patch on the posterior part.—*Griff. An. King*. iii. 434.

T. giganteus, Cuv. (*fossil*.) Size equal to that of the largest elephants. Found in France, in alluvial soil.—*Oss. Foss.* 2d edit.

FAMILY III.—SOLIDUNGULA.

Three kinds of teeth; only one apparent toe, and one hoof on each foot.

Gen. 135. *EQUUS*, Lin. Cuv. Geoff. &c.

Incisors $\frac{6}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, or $\frac{0}{0}-\frac{0}{0}$ in the females of some species, molars $\frac{6}{6}-\frac{6}{6} = 40$. Molars furrowed on each side, with flat crowns, and several ridges of enamel; a void space between the canines and molars; upper lip capable of considerable motion; eyes large; ears rather large, pointed erect, and moveable; feet terminating in a solid hoof; tail with long hair, or a tuft at its extremity; two inguinal mammæ.

E. Caballus, Lin. The Horse. Tail long, covered with long hair throughout its whole length; ears of medium size; long mane.

The horse is not known in its pristine state. Of those which have returned to the wild state, such as the numerous herds of South America, the appearance is not prepossessing, according to the ideas which have been formed of the symmetry of the domestic varieties.

The different races of the horse are numerous, most of the principal countries in

the world possessing breeds peculiar to themselves. But the Arabian race has long been considered as the noblest of the species, and as combining the qualities of endurance, vigour, and temper, in a higher degree than any of the other varieties. As breeders of horses have ascertained that the qualities of the Arabian horse may be perpetuated in his descendants, in the countries of Europe where attention is paid to the raising of this valuable animal for various purposes, the deterioration which a northern climate induces in a native of warmer latitudes is counteracted by crossing with the original breed. From the importation of the pure breed of Arabia into Europe, and the different crossings of these and their descendants with the native breeds, has arisen all that variety in appearance and qualities of the horse, which fits them for heavy draughts, the plough or the saddle.

It is in England chiefly, however, that the cultivation and education of the horse has been carried to its greatest refinement, and in this country are local races, admirably adapted to the different purposes which agriculture, or commerce, or luxury may demand. The first is the race-horse, immediately proceeding from an Arabian or Barbary stallion, with an English mare already crossed with a Barb or Arab in the first degree, or the result of two crossings in the same degree. This breed is termed first blood, or the nearest possible to the original stock; and in the quality of speed it is not probable that it can ever be exceeded. The next is the Hunter, the result of crossing a stallion of the first blood with a mare of a degree less near the original source. The third is the cross between the hunter and the more common mares, which, uniting the stronger limbs and heavier bodies of the indigenous races to the qualities of the Arabian, produce the British carriage-horses; and the great dray horse, whose gigantic proportions and immense power of draught can scarcely be surpassed, are the produce of this last with the strongest mares of the country breed. And it is a curious circumstance, that, in the mixture of all these races, the influence of the Arab blood is observable, either in the conformation of some peculiar parts, or the preservation of some peculiar qualities. The Persian, Barbary, and Turkish horses are those which come nearest to the Arabian in conformation and qualities, and the Spanish horses long enjoyed a high character in Europe, probably from the breed being kept up by the intermixture of the horses of Barbary. In France are numerous varieties, and most of them very serviceable animals. The other European races it would be impossible to enumerate here.

The Arabs divide their horses into two races. The first which they call *Kochlani*, or *Kailhan*, are those whose genealogy is known for two thousand years, and which has, they say, originated from the stud of Solomon. The other race, appropriated to servile uses, they name *Kadischi*, or horses of an unknown race. And they are peculiarly careful, by certificates and other means, to preserve the principal races pure. The mares enjoy the exclusive privilege of transmitting the purity of the race to their descendants, and the genealogies are always reckoned from the mothers.

E. Hemionus, Desm. The Dzhiggtai. Fur light bay in summer, redder in winter; mane and dorsal line black; tail terminated by a black tuft. Size of the horse. Inhabits deserts of Mongolia.—*Pall. Com. Petrop.* xix. t. 7.

E. zebra, Lin. The Zebra. Fur white, with numerous symmetrical bands of brownish black. Size of a small horse. Inhabits Africa.—*Shaw*, ii. pl. 217.

E. couagga, Desm. Gmel. The Quagga. Head and neck dark brown, with transverse grayish white stripes, the under part and legs, whitish; tail tufted. Inhabits S. Africa.—*Shaw*, ii. pl. 218.

E. montanus, Gray. The Dauw. Body covered with pure single black and white stripes down to the hoofs.—*Gray, Zool. Journ.*

E. asinus, Lin. The Ass. Fur gray, more or less reddish, with black dorsal line and a transverse band on the shoulders; ears very large; tail terminated by a tuft of hair.—*Shaw*, ii. pl. 216.

The manners of the ass in domestication are well known. Patient and tempe-

rate, the ass, but for the horse, would have been the most valuable of our domesticated beasts of burden. In eastern countries, however, the ass is still used for the saddle and as a beast of burden; and the qualities of its progeny, the mule, have secured attention to its production in many parts of the world. In a wild state the ass is still found in Kalmuc Tartary, in innumerable troops, which migrate from the north to the south, and back again according to the season. The ass varies much in size, and it has been observed to degenerate in this respect, according as it is removed from its original country. The ass couples with the horse and the zebra, but their progeny do not propagate.

ORDER IX.—RUMINANTIA.

No incisors in the upper jaw; in the lower usually eight; a vacant space between the incisors and molars, but in which in some genera are found one or two canines; molars twelve in each jaw, the crown marked with two double crescents of enamel, of which the convexity is outwards in the lower jaw, and inwards in the upper; no clavicles; extremities disposed for walking; two toes furnished with hoofs; metacarpal and metatarsal bones united; four stomachs; intestines long; two or four inguinal mammæ; horns in the males and often in the females of most species.

This is one of the most natural groups of animals. The term Ruminantia indicates the singular faculty possessed by them of masticating their food twice; and their stomach for this purpose consists of four parts, of which the first three are disposed in such a manner that these animals can at will transmit their food from the one to the other. Their food is invariably vegetables, and they are widely distributed over both continents.

* *Without horns.*—CAMELIDÆ, Smith.

Gen. 136. CAMELUS, Lin. Cuv. &c.

Incisors $\frac{2}{6}$, canines $\frac{1}{1}-\frac{1}{1}$, false molars $\frac{1}{1}-\frac{1}{1}$, molars $\frac{5}{5}-\frac{5}{5} = 36$.

Inferior incisors in the form of cutting wedges; the superior lateral; canines conical, erect, and strong; false molars on each side in the interdentary space; toes united below; head long; neck very long; upper lip cleft; nostrils slit obliquely; eyes projecting; ears small; back with fleshy hunches; callosities on the breast and flexures of the extremities; four ventral mammæ; hair woolly; tail of medium length.

C. *Bactrianus*, Lin. The Bactrian Camel. Two hunches on the back; colour generally brown. About 10 feet long. Inhabits Persia, Turkey, &c.—*Shaw*, ii. pl. 167.

C. *Dromedarius*, Lin. The Arabian Camel. One hunch on the middle of the back; fur pale brown. Nearly eight feet long. Inhabits Arabia, Turkey, &c.—*Shaw*, ii. pl. 166.

This valuable animal has been in domestication from the earliest times, and has for ages been the medium of commercial communication between the countries on either side of the great deserts of Arabia. For passing these extensive wastes the

camel is provided with an internal apparatus, in which it can carry a supply of water for ten or twelve days; and when this essential article of life runs short in the passage through the desert, the camel is sometimes killed to procure a scanty supply. To enable him to move on a soft and sinking surface, the feet of the camel are like broad and spreading cushions; the nasal openings, closing at the will of the animal, are admirably adapted for excluding the minute particles of sand; and his extreme temperance enables him to subsist for weeks on the thorny shrubs scattered over the desert, or a few dates or beans. The camel sees and hears well; and his sense of smell is so acute that it is said he can discover the presence of water at the distance of two miles. He is trained to lie down when he receives his load and to be unloaded; but when overloaded he refuses to rise and is obstinate. The general load is from three to four hundred weight, and with this weight he will travel for weeks in places where no other animal could subsist. Hence the camel, from transferring the productions of the neighbouring countries across these arid wastes, has been emphatically called the *ship of the desert*. To the wild Arab the camel is what the rein-deer is to the Laplander, invaluable. He feeds on the flesh and milk, makes clothes and tents of the hair, belts and sandals of the hide, and even the dung furnishes him with fuel.

Gen. 137. AUCHENIA, Illig.—*Lama*, Cuv.—*Camelus*, Lin.

Incisors $\frac{2}{6}$, canines $\frac{1}{0}-\frac{1}{0}$, false molars $\frac{1}{0}-\frac{1}{0}$, molars $\frac{5}{5}-\frac{5}{5} = 32$.

Teeth resembling those of the camel; muzzle little protuberant; upper lip cleft; neck slender; eyes large; ears long, pointed, and moveable; feet terminated by two toes furnished with little crooked nails, with a callous sole; callosities on the breast and knees; tail short; two mammæ.

A. glama, Desm. (*Camelus glama*, Lin.) Head long; forehead slightly protuberant, joining the face without sensible interruption; fur brownish, or variegated with white spots, composed of long soft hair. Inhabits S. America.—*Griff.* iv. 57.

Before the conquest of Peru the Lama was the only beast of burden employed by the natives. It bears some external resemblance to the camel, but without the hunches. The lama is capable of carrying a weight of 150 lbs. and can travel with this weight from sixteen to twenty miles a-day.

The Guanaco of travellers, *C. huanaca*, Shaw, &c. is perhaps a variety of this species. It differs little but in being larger and the fur of a uniform chestnut colour.

A. paco, Desm. The Paco. Face elevated above the forehead, and forming an angle with it; fur clear chestnut or gray, composed of long, fine woolly hair. About the size of a stag, but lower on its legs. Inhabits Peru.—*Mam.* 426.

A. vicugna, Desm. (*Camelus vicugna*, Lin.) The Vicugna. Smaller than the preceding; forehead projecting; fur woolly and fine, of medium length, of a clear brown fawn-colour above, and white below. S. America.—*Griff. An. King.* iv. 58.

** *Feet bisulcated*.—CERVIDÆ, Smith.

Gen. 138. MOSCHUS, Lin. Cuv. Desm.

Incisors $\frac{0}{6}$, canines $\frac{1}{0}-\frac{1}{0}$, molars $\frac{6}{6}-\frac{6}{6} = 34$. Canines wanting altogether in the females; superior canines large in the males; ears long, pointed; body slender; feet with hoofs, separated and enveloping the last phalanges; tail very short; two inguinal mammæ.

- M. moschiferus*, Lin. The Thibetan Musk. Fur of a gray brown, hair coarse; a pouch before the prepuce of the male filled with an unctuous musky substance. Size of the roebuck. Inhabits Chinese Tartary and other parts of Asia.—*Shaw*, ii. pl. 171.
- M. meminna*, Gmel. Desm. Fur olivaceous ash-coloured above, white below; sides and back marked with white spots. About 16 inches long. Inhabits Ceylon.—*Shaw*, ii. pl. 173.
- M. Javanicus*, Desm. The Kantchil. Fur deep red brown on the back; three white streaks under the throat. Size of a rabbit.—Inhabits Java.
- M. Napu*, Griff. The Napu. Fur ferruginous gray above, whitish on the sides; five white stripes under the throat divided by black ones. Size of the preceding.—*F. Cuv. Mam.*
- M. pygmaeus*, Lin. Desm. Fur reddish brown above, white below. About eight inches long.—*Shaw*, ii. pl. 172.

1st Division.—*Horns hollow and persisting—or bony and deciduous.*

1st TRIBE.—*Horns branched, deciduous, the new ones increasing in size each year, always in the males, and sometimes in the females.*

Gen. 139. CERVUS, Lin. Cuv. Desm.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}-\frac{0}{0}$ or $\frac{1}{0}-\frac{1}{0}$, molars $\frac{6}{8}-\frac{6}{8} = 32$ or 34. Canines when they exist compressed and bent back; head long, terminated by a muzzle; eyes large, pupils elongated transversely; a lachrymal sinus in most; ears large and pointed; tongue soft; body slender; four inguinal mammae; horns solid, deciduous, palmated, branched, or simple, in the males; females, with one exception, without horns.

- C. alces*, Lin. The Elk. Horns spreading into a broad palm, with numerous antlers upon its external border; muzzle tumid and cartilaginous; no canine teeth; ears long; neck short; a tuft of hair under the throat; legs very long; fur ashy brown or whitish. Inhabits Northern parts of both continents.—*Shaw*, ii. pl. 174.
- C. tarandus*, Lin. The Rein-Deer. Horns large in both sexes, with a long compressed stem, and palmated and dentated antlers; no canines; tail short. About five feet and a-half long. Inhabits the arctic circle of both continents.—*Shaw*.

The Rein-Deer is the only animal of the genus which has been subjugated by man. The Laplanders possess numerous flocks, with which they travel according to the season to places where the food of the animal is most abundant. In the inhospitable wastes of Lapland the rein-deer is invaluable to the poor inhabitants, and supplies all their wants. Its flesh and blood is used for food, its skin forms their clothes, and its tendons are split and used as thread. The castrated males are trained to the sledge, and the females furnish their families with milk. The chief food of the rein-deer is the *Lichen rangiferinus*; and in winter they dig the snow with their feet to procure it. The rutting-season is in October, and the period of gestation is thirty-three weeks. Two young are generally produced. At birth the fawns have

little knobs on their heads, and at fifteen days old the horns are about an inch long. The adult males and sterile females shed their horns in winter, the breeding females preserve theirs till the month of May. The castrated individuals often preserve their horns for a year longer than the others. The rein-deer is not now found in Europe beyond 60° N. lat., although it appears that they have formerly existed in the Pyrenees. They are found wild in Siberia, the Uralian mountains, along the river Kema to Kungus; and the Samoiedes and Koriacs possess flocks of rein-deer like the Laplanders.

C. major, Ord. Desm. The Wapiti. Horns very large, branching in serpentine curves, terminating in a fork; brow antler over the face; muzzle broad; lachrymal sinuses; tail very short; a yellowish disc on the buttocks; fur dun-brown in summer; dark brown-gray in winter. Larger than the stag. N. America.—*Griff. iv. 95.*

Var. *C. Canadensis*. Somewhat smaller; antlers more bent up, and colour darker.

C. elaphus, Lin. The Stag. Horns with three anterior antlers, all curving upwards, the summit forming a crown of snags from a common centre; lachrymal sinuses; fur red brown in summer, brown-gray in winter; a pale disc on the buttocks. Inhabits Europe, Asia, and the north of Africa. B.—*Shaw, ii. pl. 177.*

The stag sheds his horns in February, and has them renewed in July or August. It can eat the leaves of the yew without injury.

Var. The Barbary and Corsican Stag. Legs shorter, and body thicker than the common stag.

C. Wallichii, Cuv. Horns rather short, with two small antlers at base, and another further up pointing forwards; large suborbital opening; fur yellowish brown gray, with a disc on the croup; tail very short. Nepaul.—*Griff. Syn. 309.*

C. hippelaphus, Desm. Horns trifurcated, basal antler on the burr; lachrymal sinuses; fur brown; margin of the lips and chin whitish; hair coarse; a mane on the neck; tail long, terminated by a dark tuft. Size of the stag.—E. Indies.

C. unicolor, Smith. Horns long, slender; basal antler on the burr, curving upwards; another on the stem pointing inwards; fur entirely brown; throat covered with long bristly hair. Ceylon.—*Griff. Syn. 310.*

C. Aristotelis, Cuv. The Samur. Horns short, pointed; a vertical antler on the burr, with a fork near the summit of the stem pointing obliquely backwards; fur blackish and dark brown; a large mane on the neck and throat. Bengal.—*Griff. Syn. 310.*

C. equinus, Cuv. The Malayan Rusa. Horns robust, pearly; basal antler on the burr; terminal bifurcation from the internal posterior side of the stem, with obtuse points; suborbital opening very large; orange-coloured disc on the buttocks, heavy mane; canines in both sexes. Java.—*Griff. iv. 112.*

C. axis, Lin. The Axis, Penn. Horns round, elongated, rather smooth; anterior antler near the burr; summits converging; second antler on the internal side of the main branch turning backwards; lachrymal sinuses small; fur bright fulvous, spotted with white; tail long, brown above, bordered with white. E. Indies.—*Shaw, ii. pl. 180.*

- C. Mariannus*, Desm. Horns round, with two antlers, the basal one nearly vertical, the second posterior and internal; lachrymal sinuses; fur grayish brown; tail short. Less than the fallow-deer. Marianna Islands.—*Griff.* iv. 115.
- C. porcinus*, Lin. The Porcine Deer, Penn. Horns slender, with two antlers very little developed, the second near the summit; head short; ears round at tip; fur fawn-coloured, spotted with white.—*Shaw*, ii. pl. 180.
- C. dama*, Lin. The Fallow-Deer. Horns in the male only, round, with two antlers; summits palmated, deeply dentated; fur brown, with white spots, whitish below; tail long. Inhabits Europe and Western Asia. B.—*Shaw*, ii. pl. 178.
- C. capreolus*, Lin. The Roebuck. Horns rather small, cylindrical, a small antler on the middle of the stem pointing forward; a second higher up, directed backward; no lachrymal sinuses; fur gray brown or fawn-coloured, buttocks white. About $3\frac{1}{2}$ feet long. There is a black coloured variety.—Inhabits Europe. B.
- C. pygargus*, Desm. Horns cylindrical, rugous, denticulated; first antler vertical, with processes at the base, the summit bilobed; posterior antlers horizontal; fur brown, paler below; a large white disc on the buttocks; tail rudimentary. Size of the stag. Russian Tartary.—*Schreb.* tab. 253.
- C. muntjac*, Desm. Horns extremely short, upon pedicles, bent inwards, with a little rudimentary antler at the base pointing forwards; pedicles prolonged in the form of ribs down to the nose, two superior canines in the male; fur gray brown, paler below. Size of the roebuck. Inhabits India.—*Griff.* iv. 144.
- C. subcornutus*, Blainville. Horns small, with regular burr, and small process in front; the point of the stem turned back; pedicles of the horns not much prolonged on the forehead; no canines.
- C. Virginianus*, Desm. Virginian Deer, Penn. Horns much bent forwards, with an antler on the internal face of each stem directed inwards, and two or three others at the posterior face directed backwards; lachrymal sinuses; no canines; fur cinnamon fawn in summer, gray in winter. Between five and six feet long. N. America.—*Harlan*, 238.
- C. macrotis*, Say. Horns slightly grooved and tuberculated at the base, similar in form to the *C. Virginianus*; ears very long, reaching to the bifurcation of the horns; fur reddish brown; tail compressed, almost naked beneath. United States.—*Harlan's Faun. Amer.* 243.
- C. paludosus*, Desm. Horns rather large, cylindrical, terminated by a fork, with a branch above the burr pointing forward and upwards, sometimes bifurcate; muzzle large; lachrymal sinuses; tail of medium length; fur red bay above, whitish below; a black triangle on the forehead. Size of the stag.—*Griff.* iv. 134.
- C. campestris*, F. Cuv. (*C. leucogaster*, Schreb.) Horns middle-

sized, rather slender, more or less rugous; stem sub-erect, with anterior antler pointing forwards and upwards; one or two smaller behind, oblique; lachrymal sinuses; fur of reddish bay above, white below. About four feet long. Paraguay.—*Griff.* iv. 136.

C. nemoralis, Smith. Horns about eight inches long, sub-vertical, rugous at the base; small anterior antler about the middle of the stem; posterior second antler forming a fork with the summits of the horn, which flattens and turns inwards and forwards, making a hook; black spot on the nose and each side of the neck, and one on lower lip, all on a white ground; fur on the back brown gray. S. America.—*Griff. An. King.* iv. 137.

C. rufus, Desm. Horns short, simple; canines in the upper jaw of the male; lachrymal sinuses; tail pretty long; fur bright red above, white below. Four feet long. Paraguay.—*Griff.* iv. 104.

C. simplicornis, Smith. Horns small, simple, pointed; dark ring round the orbits, and spots about the corner of the upper lip; fur bright fulvous; tail short, with long hair of a red colour. Size of the roebuck. Inhabits Brazil.—*Griff.* iv. 141.

C. nemorivagus, Desm. Horns straight, about two inches long; lachrymal sinuses small; fur of a grayish brown above, white below. S. America.—*Griff.* iv. 142.

C. Hibernus, (*fossil*,) Desm. (*C. giganteus*, Cuv.) Horns of very great dimensions, forming a large palm, with antlers on both borders, fewer than in the elk; spread of the horns nine to twelve feet. The skeleton of a fine specimen of this animal from the Isle of Man is in the Edinburgh Museum.—Found fossil in Europe.

C. palæodama, Cuv. Horns resembling those of the fallow-deer, but with only one antler on the stem.—Found fossil in Sweden.

C. Somonensis, Desm. Horns resembling those of the fallow-deer, but larger, and rising immediately from the frontal bone.—Fossil in France and Germany.

C. Guetardi, Desm. Horns similar to the rein-deer, but smaller in dimensions, almost filiform, with two antlers at their base.—Fossil in France.

2d TRIBE.—*Horns or prominences of the frontal bone enveloped in a hairy skin, in both sexes.*—GIRAFFIDÆ, Smith.

Gen 140. CAMELOPARDALIS, Lin. Cuv. Geoff. &c.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{6}{6}$ — $\frac{6}{6}$ = 32. Head very long, with a bony tubercle on the forehead, and two osseous peduncles covered with skin and hairy, terminated by a tuft of bristles; upper lip entire; no lachrymal sinuses; ears pointed; tongue rough, with corneous papillæ; eyes large; neck extremely long; withers much elevated; legs slender; a callosity on the sternum; four mammæ.

C. giraffa, Gmel. Desm. (*C. Camelopardalis*, Lin.) The Giraffe. Fur variegated with brown and ferruginous angular and numerous spots; tail terminated by a tuft of dark long hairs. Height before about 15 feet. Inhabits Central Africa.—*Shaw*, ii. 182.

The Giraffe seems to have been unknown to the Greeks. In the year 708 of Rome, Julius Cæsar brought one to Europe, and the Roman Emperors afterwards exhibited them at Rome, either for the games in the circus, or in their triumphs over the African princes. Albertus Magnus, in his *Treatise de Animalibus*, is the first modern author who speaks of the giraffe. In 1486 one of the Medici family possessed one at Florence, where it lived for a considerable time. In its native country the giraffe browses on the twigs of trees, preferring plants of the *Mimosa* genus; but it appears that it can without inconvenience subsist on other vegetable food. The one kept at Florence fed on the fruits of the country, and chiefly on apples, which it begged from the inhabitants of the first storeys of the houses. The specimen in Paris, from its having been accustomed in early life to the food prepared by the Arabs for their camels, is fed on mixed grains bruised, such as maize, barley, &c. and it is furnished with milk for drink morning and evening. It however willingly accepts fruits and the branches of the acacia, which are presented to it. It seizes the leaves with its long rugous and narrow tongue by rolling it about them, and seems annoyed when it is obliged to take any thing from the ground, which it seems to do with difficulty. To accomplish this it stretches first one, then the other of its long fore-legs asunder, and it is not till after repeated attempts that it is able to seize the objects with its lips and tongue. The pace of the giraffe is an amble, though when pursued it flies with extreme rapidity, but the small size of its lungs prevents it from supporting a lengthened chase. The giraffe defends itself against the lion, its principal enemy, with its fore-feet, with which it strikes with such force as often to repulse him. The name *Camelo-pardalis* (camel-leopard) was given by the Romans to this animal, from a fancied combination of the characters of the camel and leopard; but its ancient denomination was *Zurapha*, from which the name Giraffe has been adopted.

3d TRIBE.—*Prominences of the frontal bone covered with a horny case*.—CAPRIDÆ, Smith.

Gen. 141. ANTILOPE, Cuv. Geoff. Desm.—*Capra*, *Moschus*, Lin.

Incisors $\frac{0}{8}$, canines $\frac{0}{6}-\frac{0}{6}$, molars $\frac{6}{6}-\frac{6}{6} = 32$. Horns in both sexes, or in the males only, covering a solid bony core, round, compressed, variously inflected, and often marked by transverse annulations, or a projecting spiral ridge, sometimes bifurcated; muzzle partly naked in the greater number; often lachrymal sinuses; ears large; legs slender; two or four mammae.

A. cervicapra, Pall. Desm. The Common Antelope. Horns black, round, with a triple bending, and annulated the greater part of their length; tufts on the knees; fur fawn-coloured above, white below. About four feet long. India.—*Pall. Spic. fas. i. t. 1, 2*.

A. Saiga, Desm. Pall. (*Capra Tatarica*, Lin.) Horns of the male yellow, transparent, marked by 16 or 18 rings, smooth at the point, arched and lyre-shaped; muzzle cartilaginous, gibbous; nostrils very open; fur fulvous above, white below; tufts on the knees. Body four feet long. Inhabits sandy deserts near the Caspian Sea.—*Pall. Spic. fas. xii. t. 1 and 3*.

A. gutturosa, Pall. Desm. Horns of the male black, lyre-shaped,

with transverse rings ; larynx forming a remarkable projection before the neck ; glandular bag near the prepuce ; fur fawn-coloured in summer, grayish in winter. Inhabits deserts in Central Asia.—*Pall. Spic. fas. xii. t. 2, 3, fig. 14-17.*

Sub-Gen. 1. *GAZELLA*, Blainville.—*Horns with double flexure, lyre-shaped, annulated, without ridges, in both sexes.*

A. dorcas, Pall. Desm. Horns black in both sexes, lyre-shaped, annulated in the greater part of their length ; fur fawn-coloured above, white below, with a band of brown black upon each flank ; tail tufted with black ; no projection of the larynx. Smaller than the roebuck. Inhabits Northern Africa, &c.—*Buff. xii. pl. 23.*

Major Smith describes three varieties of this species under the names of *A. Kevela*, *Corinna*, and *Cora*.

A. subgutturosa, Desm. Horns large, grayish black, lyre-shaped, annulated ; larynx projecting ; fur ash-coloured above, white below, a brown band on each flank. Three feet and a-half long. Inhabits Persia, &c.—*Schreb. t. 170, B.*

A. Euchore, Forster, Desm. The Springbok. Horns brown black, lyrate, annulated ; a longitudinal fold of skin on the croup, with white hairs ; fur fawn-coloured, white below, with a brown line on each flank. About four feet and a-half long. Inhabits plains of Southern Africa.—*Shaw, ii. pl. 102.*

A. pygarga, Desm. Pall. Horns black, round, lyrate, with eleven or twelve projecting rings ; fur hoary brown above, whitish below ; head and neck of a red gray ; a line of white on the forehead ; belly and buttocks white ; no lachrymal sinuses. Upwards of five feet long. Inhabits Southern Africa.—*Schreb. t. 273.*

A. mytilopes, Smith. Horns one foot long, slender, round, sublyrate, black, with thirteen or fourteen obsolete rings, standing on a broad rufous spot ; space between the eyes, mouth, under jaw, breast, belly, croup, and legs, white ; a bar across the nose, neck, shoulders, and flanks fulvous ; hoofs broad, flat, rounded. Inhabits Western Africa.—*Griff. iv. 204.*

A. melampus, Desm. The Pallah. Horns black, round, very long, lyrate, strongly annulated at their base ; fur ferruginous above, white below ; a black line on the back and a transverse band of the same colour on the buttocks ; a black spot above the spurious hoofs. Nearly five feet long. Cape of Good Hope.—*Daniell's Afr. Scen. No. 9.*

A. Senegalensis, Desm. The Senegal Antelope, Penn. Horns black, a little flattened laterally, lyrate, very long, marked with from 12 to 17 rings, and their termination smooth ; head and tail long. About 5 feet long. Inhabits Senegal.—*Penn. Quad. p. 38.*

Sub-Gen. 2.—*CERVICAPRA*, Blainville. *Horns simple, few or no annulations or ridges.*

† *Horns bent forwards.*

A. dama, Pall. Desm. Horns short, round, black, bent forwards

and inwards, smooth at the extremity, with five or six broad ill-defined rings at the base ; fur white, with the neck, back, and shoulders rufous ; a fawn-coloured spot over each eye. Three feet and a half long. Inhabits Senegal.—*Schreb. t. 265.*

A. redunca, Pall. Desm. Horns short, round, black, sub-erect, a little bent forwards ; fur entirely fawn-coloured. Four feet and a-half long. Inhabits Africa.—*Schreb. t. 265.*

A. villosa, Burchell. Horns $8\frac{1}{2}$ inches long, straight, vertical, slightly inclining forward, round, slender, with thirteen rings, sharp-pointed ; black spot before the eyes ; suborbital sinus large beneath. Body slender, fur whitish gray, beneath white ; hair soft and villous ; tail tipped with white. Length four feet and a-half. Southern Africa.—*Griff. Syn. 339.*

A. tragulus, Desm. The Steenbock. Horns vertical, round, slender, and pointed, wrinkled at the base ; fur reddish above, white below ; ears pointed ; groin naked and black.—Inhabits Caffraria.

A. melanotis, Desm. (*A. grisea*, Cuv.) The Grysbock. Horns black, round, vertical, slightly bent forward ; fur deep chestnut red, mixed with white hairs, whitish below ; ears broad, open.—Inhabits Caffraria.

A. eleotragus, Schreb. Desm. The Rietbock. Horns 10 or 12 inches long, black, slightly curved, with the points forward, and oblique obsolete annulations on the first half ; fur woolly, cinereous above, white below ; tail nine or ten inches long. Inhabits Caffraria.—*Shaw, ii. pl. 193.*

A. acuticornus, Blainville. Horns three inches long, round, smooth, black and pointed, slightly bent outwards and forwards, the frontal crest passing behind them.—India.

†† *Horns erect.*

A. oreotragus, Desm. The Klipspringer. Horns five inches long, distant, round, vertical, slightly inclined forwards, obscurely wrinkled at the base and annulated in the middle ; tips smooth and pointed ; fur olive-coloured, hard, and spirally twisted. Inhabits Caffraria.—*Shaw, ii. pl. 183.*

A. pallida, Lichtenstein. Horns perfectly straight, inclining backwards, round, with an obsolete ridge in front, four inches long, very pointed ; fur pale fawn-coloured above, white below ; a black naked ring round the eyes. Caffraria.—*Griff. Syn. 342.*

A. subulata, Smith. Horns $\frac{5}{8}$ of an inch in diameter, subvertical, round, smooth, $4\frac{1}{2}$ inches long, slightly bent inwards. E. Indies.—*Griff. Syn. 342.*

A. Chickara, Hardwick. Superior horns black, subulate, round, without rings, erect, smooth, three inches long ; spurious horns little more than an inch long, placed between the middle line of the orbits ; fur bright gray, whitish beneath. India.—*Lin. Trans.*

A. capreolus, Desm. Lichst. The Rehbock. Horns black, round,

pointed, vertical, parallel, slightly annulated for half their length; fur woolly, grayish-red above, white below; no lachrymal sinuses. About five feet long.—Cape of Good Hope.

A. Lalandia, Desm. Horns erect, slender, shorter than the head, parallel; fur long, grayish-brown on the back, white on the belly. Cape of Good Hope.—*Dict. Class. Hist. Nat.* i. No. 14. pl. 1.

A. silvicultrix, Schreb. Desm. The Bush Antelope. Horns black, round, short, wrinkled at the base, rugous higher up, and smooth at the tip, slightly bent outwards; fur shining-brown, with the lumbar and dorsal region covered with long fawn-coloured hair; lachrymal sinuses; no tufts on the knees; tail pendulous, tufted. Inhabits Sierra Leone.—*Griff.* iv. 258.

A. quadriscopa, Smith. Horns four inches long, reclining, straight, diverging, pointed, with six or seven small annuli at the base; ears longer than the horns; fur yellowish gray, white beneath; legs slender, with tufts on the knees and hind-legs. Size of the roebuck. Africa.—*Griff. Syn.* 345.

A. mergens, Blainville. The Deukerbok. Horns erect, annulated at the base, a half shorter than the head; fur dun, with the extremity of the feet brown and a line of the same colour on the anterior face of the fore-legs; a suborbital furrow. Inhabits Cape of Good Hope.—*Desm. Mam.* 463.

A. grimmia, Desm. (*Moschus grimmia*, Lin.) Horns very short, stout, erect; fur fawn-coloured; face and line down the back dark; ears short and broad; legs gray; tail black at the point; a lengthened suborbital slit, but no lachrymal sinus. Two feet and a-half long. Inhabits Guinea.—*Mam.* 464.

A. cærulea, Smith. Horns very small, black, pointed, with five semi-annuli nearly concealed in the hair of the forehead; fur slaty purplish-blue, white beneath. Upwards of two feet long. Caffraria.—*Griff. Syn.* 348.

A. scoparia, Desm. Horns small, erect, with five annulations in the first half, points smooth, black; head and upper parts of the body pale fulvous; lower parts white; tail short, blackish; tufts on the knees. Inhabits Cape of Good Hope.—*Schreb.* t. 261.

A. pygmæa, Pall. Desm. The Pigmy Antelope. Horns small, about an inch long, black, pointed; fur bright bay, whiter below; no tufts on the knees; a small lachrymal opening. Twenty inches long. Inhabits Central Africa.—*Shaw*, ii. pl. 188.

††† *Horns bent backwards.*

A. Sumatrensis, Desm. Horns six inches long, round, bent back, with ten or twelve wrinkles at base; fur brown black; neck and back with long white hairs; lachrymal sinuses with a small opening. Length $4\frac{1}{2}$ feet. Sumatra.—*Marsden's Sum.* p. 93.

A. goral, Hardwick. Horns four and a-half inches long, black, subulate, bent back, with five or six annuli at the base. Fur grayish-brown, whitish under the throat. Nepaul.—*Lin. Trans.*

Sub-Gen. 3. *ALCELAPHUS*, Blainv.—*Horns with double flexures, annulated, without ridges, in both sexes; lachrymal sinuses, but no inguinal pores.*

A. bubalis, Pall. Desm. Head much elongated; horns black, of medium length, strongly annulated in a spiral form; point directed backwards; fur fawn-coloured; tail black at the end. Size of the stag. Inhabits Northern Africa.—*Buff.* xii. pl. 37, 38.

A. caama, Desm. Schreb. The Hartbeest. Head very long; horns thick, strongly annulated obliquely to the second bending; the points much prolonged backwards; fur bay fawn-colour, deeper on the back, with black or brown at the base of the horns, upon the forehead, and the anterior face of the legs. Upwards of six feet long. Southern Africa.—*Schreb.* t. 277.

Sub-Gen. 4. *TRAGELAPHUS*, Blainville.—*Horns more or less compressed, spiral, with ridges in both sexes, or in the males only; lachrymal sinuses sometimes wanting.*

A. strepsiceros, Desm. Horns very long, diverging, describing three elongated spiral turns, smooth, compressed, with two ridges; a mane on the neck; fur brownish gray, with a dorsal line, and many transverse white bands on the flanks. Eleven feet long. Interior Africa.—*Daniell, Afr. Scen.* No. 6.

A. sylvatica, Gmel. Desm. The Boshbock. Horns in the male only, ten inches long, with an obsolete ridge on both sides, spiral and sublyrate, black and closely annulated at base, smooth at the point; fur chestnut above, with white spots on the neck, croup, and thighs. Length $3\frac{1}{2}$ feet. Caffraria.—*Shaw*, ii. pl. 193.

A. scripta, Pall. Desm. Horns seven inches long, reclining, straight, wavy, with two ridges twisting spirally round the axis; fur fulvous bay, with white transverse bands at the flanks, and spots on the thighs. Length $4\frac{1}{2}$ feet. Senegal.—*Shaw*, ii. pl. 186.

Sub-Gen. 5. *OREAS*, Desm.—*Horns straight, with a very strong spiral ridge, in both sexes; no lachrymal sinuses; four mammae; tail long and tufted.*

A. oreas, Desm. Horns black, very thick, diverging, with a strong ridge, describing two spiral turns, towards their base, smooth at the point; a little mane upon the neck and back; a dewlap with long hairs, and a projection of the larynx below; fur grayish fawn-coloured. Length eight feet.—*Pall. Spic. fas.* xii. p. 17.

Sub-Gen. 6. *BOSELAPHUS*, Blainville.—*Horns simple, not rugous, variously curved, without spiral ridge.*

A. picta, Pall. Desm. The Nyl-ghau. Horns conical, black, smooth, with a triangular prolongation at their base; much separated, bending forwards and upwards; lachrymal sinuses; fur gray in the male, fawn-coloured in the female; a tuft of long dark hair on the throat; black and white rings on the pasterns; tail tufted. Inhabits India.—*Shaw*, ii. pl. 189.

- A. gnu*, Gmel. Desm. The Gnu. Horns in both sexes, strong, large, flattened at the base, arising from the occiput, bent forwards upon the eyes, and turning up into a pointed hook ; a vertical mane on the neck, with a beard and dewlap ; fur brown ; tail long and lined with long white hair. Length five feet and a-half. Inhabits Southern Africa.—*Shaw*, ii. pl. 196.
- Sub-Gen. 7. *ORYX*, Desm.—*Horns in both sexes, large, pointed; erect, or with a slight bend posteriorly, annulated, but with a ridge; lachrymal sinuses; tail tufted.*
- A. oryx*, Pall. Desm. The Caffrarian Oryx. Horns black, thin, round, very long, nearly straight ; fur gray above, white below, with a black dorsal line ; head whitish, with a line over each eye and across the forehead of brown black ; a chestnut spot on the shoulders and thighs. Five feet long. Southern Africa.—*Schreb.* t. 257.
- A. leucoryx*, Desm. Pall. The White Oryx. Horns very long, (three feet,) slender, horizontal, bent backwards, obliquely annulated, tips smooth ; fur white ; black spot at the base of the horns passing down the face ; a second through the eyes, towards the mouth ; lower part of the thighs rufous ; short dark mane ; tuft of the tail black. Size of a small horse. Arabia and Persia.—*Shaw*, ii. pl. 184.
- A. Addax*, Smith. Horns upwards of two feet long, robust, black, round, divergent, with two and a-half spiral turns, and 32 to 35 annuli extending three-fourths of the length ; no lachrymal sinus ; dark coloured mane on the neck, and a tuft of hair on the throat ; head and neck grayish, the rest of the body white ; tail tufted. Inhabits Nubia.—*Griff.* iv. 193.
- A. gazella*, Pall. Desm. Horns black, round, slender, three feet long, bent back, with thirty-six annulations, not spiral ; forehead narrow ; head long ; body clumsy ; lachrymal sinuses ; body and neck fulvous gray, with a reversed ridge of short white hair on the neck ; head white ; a dark spot at the root of the horns, passing down the face. Perhaps this, as well as the *A. Tao* of Major Smith, is but a variety of the preceding.—Interior of Senegal.
- Sub-Gen. 8. *EGOCERUS*, Desm.—*Horns very large and strong, pointed, simply bent back, annulated; a half muzzle, and no sub-orbitary sinus; tail pretty long.*
- A. leucophæa*, Pall. Desm. The Blue Antelope. Horns slightly compressed, scimitar-shaped, about twenty inches long, closely annulated with from twenty to thirty rings ; ears long ; fur silvery blue gray ; short white mane turning towards the head ; tail tufted at the end. Nearly six feet long. Southern Africa.—*Shaw*, ii. pl. 195.
- A. equina*, Geoff. Desm. Horns very robust, about 24 inches long, strongly bent back, with from 17 to 27 prominent rings ; fur

coarse, undulating, grayish brown ; a white spot round the eye, formed of long hairs. Inhabits Southern Africa.—*Desm.* 476.

Sub-Gen. 9. *RUPICAPRA*, Blainville.—*Horns simple, vertical, round and striated, strongly bent backwards towards the point, in both sexes ; no lachrymal sinuses nor inguinal pores ; tail very short ; two mammae.*

A. rupicapra, Pall. (*Capra rupicapra*, Lin.) The Chamois. Horns seven or eight inches long, perpendicular to the head, hooked at the end ; fur fawn-coloured in summer, and brown in winter ; a dark line through each eye ; tail short. Between three and four feet long. Switzerland.—*Griff.* iv. 281.

Var. A. The Yzard. Smaller, gray brown, cheeks and buttocks fawn-colour.—Inhabits the Pyrenees.

Var. B. The Persian Chamois. Horns bent back into a regular hook from their root ; colour rufous yellow.

Sub-Gen. 10. *ANTILOCAPRA*, Blainville.—*Horns compressed, bent into a hook posteriorly towards the point, and furnished with an anterior antler ; general form of the antelope.*

A. furcifer, Desm. Horns one foot long, compressed, flat on the inner side, striated, with a compressed antler to the front forking with the after part, which forms a hook backwards ; colour reddish brown above, white below ; a red mane on the neck ; tail very short. Larger than the roebuck. United States.—*Griff.* iv. 170.

Gen. 142. *CAPRA*, Lin. Pall. Cuv. Desm. Geoff.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{6}{6}-\frac{6}{6} = 32$. Horns common to both sexes, directed upwards and backwards, striated transversely ; no muzzle ; interval between the nostrils naked ; no lachrymal sinus, or inguinal pores ; ears pointed ; legs robust ; tail short ; chin bearded.

C. Ibex, Lin. The Ibex. Horns flat, with two longitudinal ridges at the sides, crossed by numerous transverse knots, subvertical, curved backwards, about thirty inches long, dark-coloured ; fur gray fawn-coloured, whitish below, with a dorsal line of blackish brown. Five feet long. Inhabits the Alps, Pyrenees, &c.—*Shaw*, ii. pl. 198.

C. Jaela, Smith. Abyssinian Ibex. Horns three feet long, forming a semicircle backwards, subtriangular, with twenty-three variegated prominent knots ; fur brownish fawn-coloured, with a dark dorsal line ; long hair under the throat. Abyssinia.—*Griff.* iv. 301.

Var. The Siberian Ibex of Pallas. Black line on the back and down the front of the legs.

C. Caucasica, Desm. Horns triangular, the anterior edge obtuse, irregularly marked with transverse knots and uniform wrinkles ; fur dark brown above, white beneath the breast ; line on the back dark. Caucasian Mountains.—*Griff.* iv. 302.

C. agagrus, Desm. Pall. The Goat. Horns forming an acute angle to the front, rounded at the back, ribbed transversely ; head black in front ; beard brown ; general colour brown and gray, varying with the seasons.—Mountains of Persia, &c.

The domestic goat, (*C. Hircus*) the principal variety of the original breed, has the horns a little more vertical than the *agagrus*, and is a little smaller. It is known all over Europe. The Welsh breed is of a large description, with fine long hair. The Persian goat has long coarse ash-brown hair, and a large tuft of hair between the horns. The dwarf goat, originally from Guinea, now extremely multiplied in South America and the West Indies, is distinguished by close short hair more or less white with fawn colour, the males having the beard, tail, neck, and legs black, and without horns. The Cachemire breed have the hair long, silky, straight and white, the ears large and turned downwards ; and the Thibet or Tartar half breed of the same has likewise very fine and white hair, but more subject to vary in the colour. The Angora breed has long soft hair, mostly white, with buff-coloured ears and yellowish horns ; the Nepaul breed has long legs and the horns short and spiral, the hair long, loose, and blackish ; and the Syrian breed is blackish where the hair is long, with the head, ears, legs, and belly white mottled with black. In Egypt there are three varieties, one with long hair, a second with spiral horns and ears longer than the beard ; and a third with very large ears and the horns small or none. But, like other domesticated animals, the goat runs into endless varieties.

C. Jemlachica, Smith. The Jemlah Goat. Horns placed obliquely on the frontal bone, high above the orbits, almost in contact, depressed, nearly flat, nine inches long, inclining outwards, then tapering and turning inwards ; anterior edge marked with seven small protuberances ; fur cinereous fawn-coloured, with abundant long hair ; a dark line down the face and along the spine. Size of the Ibex. Himalayah Mountains.—*Griff.* iv. 308.

Gen. 143. Ovis, Lin. Cuv. Geoff. Desm.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{6}{6}-\frac{6}{6} = 32$. Horns common to both sexes, sometimes wanting in the female, thick, angular, wrinkled transversely, pale coloured, turned laterally in a spiral form ; ears small ; legs slender ; hair of two kinds ; tail more or less short ; two mammæ.

O. tragelaphus, Desm. The Bearded Sheep, Penn. Horns two feet long, wrinkled, angular, black, turned spirally backwards and downwards ; a large beard from the cheeks and under jaw divided into two lobes ; neck short, with a mane ; knees covered with long hair ; general colour rufous brown ; tail short. Five feet nine inches long. Inhabits Barbary.—*Shaw*, ii. pl. 202.

O. montana, Geoff. American Argali. Horns very thick, of a spiral form, directed laterally ; colour brown chestnut, formed of short dry hairs ; a white disc on the rump ; no mane. Inhabits Canada.—*Griff.* iv. 318.

O. Ammon, Desm. (*Capra Ammon*, Lin.) The Argali. Horns of the male very large and strong, sometimes four feet long, placed on the summit of the head, triangular, flattened before, striated across ; female with slender wrinkled horns ; colour fulvous gray above, white below, with white on the muzzle, and a whitish

disc on the buttocks. Five feet long. Inhabits mountains and Steppes of Northern Asia.—*Shaw*, ii. pl. 201.

- O. aries*, Desm. (*Capra Ammon*, Lin.—*Musmon*, Plin.) The Sheep. Horns very strong, arched backwards, and curved downwards and towards the point; general colour fawn, more or less brown, white on the face and legs, and under the belly; a darker streak on the dorsal line, on the flanks, and often black about the neck.—*Corsica, Sardinia, &c.*

Sheep live in families more or less numerous upon the most inaccessible mountains of Asia, Africa, Europe, and America. They are found in flocks of sometimes a hundred in number, conducted by an experienced leader. In the rutting-season these flocks divide into little bands formed by a single male and the females attached to him. When they meet at this season the males fight by butting with their heads, and sometimes kill one another. The domestic varieties are distinguished by differences in form, size, colour, and in horns. The long-legged sheep of Guinea has the body covered with hair, with a kind of mane on the neck. The Barbary and Egyptian broad-tailed sheep, (*Ovis laticaudata* of Ray) has the wool coarse, the tail long, and wider than the buttocks at its base, and many other breeds exist in Africa, distinguished by their horns, the nature of their wool, and the size of the tail. The Asiatic breeds have some of them the broad tail of the African sheep. The Astracan breed is distinguished by its fine spirally curled wool; the Circassian race has the tail of such length as to trail on the ground; and other Asiatic families are distinguished by the number of their horns, which vary from four to six. India and China possess also particular breeds; but it is in Europe that, at the present day, the most useful varieties are found. The Merino sheep of Spain holds the first place among the European varieties, but in no country in Europe has the rearing of this valuable animal met with so much attention as in Great Britain. Wool was long a staple of her commerce, and was exported for centuries; and now, since circumstances have changed, and that the manufactures of the country create a demand for the wool raised, the annual value of wool shorn in England is not less than five millions Sterling. The varieties of the sheep in Britain are numerous, and adapted to all the different kinds of pasture and situation. The original breeds of the country still exist in Shetland and the northern counties of Scotland.

Gen. 144. OVIBOS, Blainville.—*Bos*, Lin. Cuv.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{6}{6}$ — $\frac{6}{6}$, = 32. Body thick, heavy; legs short; face elevated; forehead long and bushy; horns very strong, directed laterally; no muzzle; ears short, eyes small; no furrow in the upper lip; tail very short.

- O. moschatus*, Desm. (*Bos moschatus*, Gmel.) The Musk Ox. Adult male size of a small cow; horns rising from the summit of the head, close together and wide at their base, then tapering, and bent down against the cheeks, with the point turned up; fur brownish black, long and woolly. N. America.—*Shaw*, ii. pl. 212.

The *O. Pallantis*, (*fossil*), found on the coast of Siberia, is not ascertained to be a separate species.

Gen. 145 *Bos*, Lin. Cuv. Geoff. Desm. Lin.

Incisors $\frac{0}{8}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{6}{6}$ — $\frac{6}{6}$ = 32. Body large, members strong; head large; forehead straight; muzzle square; eyes large; ears generally funnel-shaped; a fold of the skin or dew-lap on the under side of the neck; four mammae; tail long, tufted; horns simple, conical, round, with different inflections, but often directed laterally, and the points raised.

- B. Caffer**, Desm. Gmel. The Cape Buffalo. Horns in contact at the base spreading horizontally, and turned up at the point; ears wide rather than pendant; dewlap large; fur deep brown. About nine feet long.—Interior of Africa.
- B. pegasus**, Smith. Horns lying across the summit of the head, the tips turned up; colour deep brown, with obscure transverse bands; neck with a dense mane; ears long, pendulous; feet white. Inhabits Central Africa.—*Griff. Syn.* 371.
- B. Arnee**, Shaw. The Arnee. Horns triangular, rising obliquely, wrinkled, slightly hanging forwards, with the points turned inwards and backwards; fur black, very hairy, tail tufted. Seven feet high at the shoulders. Inhabits India, and the domesticated varieties China and Indian Archipelago.—*Shaw*, ii.
- B. Bubalus**, Lin. Domestic Buffalo. Horns directed laterally, compressed, with a ridge in front, reclining towards the neck, and the tip turned up; forehead convex; mammæ of the male placed in a transverse line; colour darkish or black; hair coarse; tail tufted at the end.
- B. Americanus**, Gmel. Desm. The American Bison. Horns small, round, black, and very distant, turned laterally and upwards; head short and thick; eyes full; head, shoulders, and upper part of the anterior extremities covered with long brownish woolly hair, tail tufted with black. Eight feet long. Inhabits interior of N. America.—*Shaw*, ii. pl. 206, 207.
- B. grunniens**, Lin. Desm. The Yak. Horns round, smooth, pointed, bending laterally forwards and upwards; forehead flat; lips tumid; muzzle small; occiput covered with frizzled hair; withers projecting; hair on the neck and back very woolly, whitish and black, that of the flanks long and pendant; tail with very long hair. Inhabits the Mountains of Central Asia.—*Shaw*, ii.
- B. urus**, Desm. Pall. (*Bos Taurus*, var. *urus*, and *Bos Bonasus*, Lin.) The European Bison. Horns thick, round, lateral, curved upwards and forwards; forehead square; head and anterior part of the body covered with brown thick and coarse hair; below the throat to the breast a pendant beard, more than a foot long; mammæ disposed in a square form. Upwards of ten feet long. Forests in Europe.—*Shaw*, ii. pl. 205.
- B. Gaurus**, Smith. The Gaur. Adult male six feet high at the shoulders, twelve feet long; head resembling the common ox; forehead more arched; horns robust, not bent back; a spinous elevated process on the neck and shoulders; short tufts of dirty white coloured hairs on the forehead; hair smooth, shining. Inhabits the district of Surjoogah in India.—*Breton, in Trans. Med. Soc. Calcutta*, ii. p. 247.
- B. Gavæus**, Smith. The Gayal. Head broad and flat; horns strong, short, distant, lateral, compressed, turned upwards and forwards; dewlap fringed with long hair; a ridge over the shoulders; ge-

neral colour brown ; tail tufted. Perhaps a variety of the preceding.—Inhabits forests east of the Burrampooltra.

B. taurus, Plin. Desm. Horns round, lateral, arched, with the point turned outwards ; face flat, or a little concave ; occipital crest on the same line as the base of the horns ; mammae disposed in a square form ; hair fawn-coloured, brown or black, not sensibly longer at the anterior than the posterior parts. About seven feet long.—*Griff.* iv. 411.

The domestic varieties of the Ox have been divided into two races, viz. those which have a hunch on their shoulders, and those which have the back straight. Regarding their derivation from the existing wild races, from the Urus, the Bison, or the Yak, all is conjecture. The races with hunches are found in India, the eastern parts of Persia, Arabia, and the African Continent, from the Cape of Good Hope to Madagascar. The great Indian ox of Pennant, or Zebu, equals or surpasses the largest European breeds in size, and the hunch on the shoulders sometimes weighs fifty pounds. A smaller hunched variety has the shape and proportions of an ordinary ox, colour whitish gray, and with the horns bent forwards. A third variety, scarcely larger than the hog, possesses the hunch, but has no horns ; and a fourth, with two hunches, is found near Surat. Besides these varieties there is a race reared in Abyssinia, in the Galla country, and northern Central Africa, which is generally white, and provided with immense horns. The straight-backed varieties vary much in form, size, and horns, and are spread over all Europe. In England the breeds of this valuable animal are much improved, both for the purposes of the dairy and the butcher. The white Urus, a wild variety, formerly inhabited the woods of Scotland and the north of England, and a few of the ancient race are still preserved. The ox is found fossil over nearly the whole of Europe.

ORDER X.—CETACEA.

Body pisciform, terminated by a caudal appendage, cartilaginous, and horizontal ; two anterior extremities formed like fins, having the bones which form them flattened and very short ; head joined to the body by a very short thick neck ; two pectoral or abdominal mammae ; ears with very small external openings ; brain large ; pelvis and bones of the posterior extremities represented by two rudimentary bones lost in the flesh.

FAMILY I.—SIRENIA.—*Herbivorous Cetacea.*

Two molars with flat crown ; sometimes tusks in the upper jaw ; two pectoral mammae ; mustaches ; nostrils, properly so called, placed at the end of the muzzle ; nasal apertures on the upper part of the head ; body very massive.

Gen. 146. *MANATUS*, Lin. Cuv. Desm.—*Trichecus*, Lin. Shaw. Incisors $\frac{2}{0}$, canines $\frac{0}{0}$ — $\frac{0}{0}$, molars $\frac{2}{9}$ — $\frac{9}{9}$ = 38. The incisors exist only in the foetus, and the adults have but 32 teeth, four of the molars falling out in early age ; molars with two transverse cushions on their crown ; head not distinct from the body ; eyes very small ; tongue oval ; vestiges of nails

on the margin of the pectoral fins; six cervical vertebræ; sixteen pairs of thick ribs; mustaches composed of a bundle of very strong hairs directed downwards, and forming on each side a kind of corneous tusk.

The animals of this genus are gregarious, and feed on marine vegetables. The male and female demonstrate much attachment to one another, and tenderness for their young. The female, from the position of the breasts, may have given rise among mariners to the fable of the mermaid.

M. Americanus, Desm. Head bony, rather elongated; nasal foramina thrice as long as broad; inferior margin of the lower jaw straight; skin grayish, slightly shagreened, with isolated hairs. Body sometimes 20 feet long. Inhabits Rivers of S. America.—*Desm. Nouv. Dict. d'Hist. Nat.* xviii. pl. G. 9.

M. Senegalensis, Desm. (*Trichecus Australis*, Shaw.) Head bony, short in proportion to its breadth; breadth of nasal foramina three-fourths of their length; inferior margin of lower jaw curved; smaller than the preceding. About eight feet long. Inhabits the mouth of the Senegal.—*Shaw*, i. pl. 69.

Gen. 147. HALICORE, Cuv.—*Trichecus*, Gmel.—*Dugongus*, Lacep.

Incisors $\frac{2}{0}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{3}-\frac{3}{3}$, = 14. In early age, incisors $\frac{4}{8}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{5}{5}-\frac{5}{5}$ = 32. Two of the upper incisors cylindrical and straight, forming tusks; molars cylindrical, and only three on each side in the adults; body pisciform, terminated by a horizontal fin with two lobes; head not distinct from the body; muzzle truncated and moveable, with thick spiny hairs on the edges of the lips; tongue soft; fins short, without distinct fingers or nails; seven cervical vertebræ; eighteen pairs of ribs.

H. Indicus, Desm. The Dugong. Body pisciform; two short tusks in the upper jaw, straight and directed obliquely downwards; lips very thick, spinous; tail divided into two lobes; general colour bluish gray. 7 or 8 feet long.—Inhabits the Indian Seas.

Gen. 148. STELLERUS, Cuv.—*Trichecus*, Gmel.

Incisors $\frac{0}{0}$, canines $\frac{0}{0}-\frac{0}{0}$, molars $\frac{1}{1}-\frac{1}{1}$ = 4. Teeth not implanted in the jaws, but attached to a molar plate by vessels and nerves; triturating surface hollowed into tortuous canals; body enlarged in the centre, diminishing insensibly to the caudal fin; head obtuse, without distinct neck; no external ears; lips double; a cartilaginous crest to cover the eyes; anterior extremities in the form of palmated fins; caudal fin very broad, crescent-shaped, with two points.

S. Borealis, Desm. (*Trich. Borealis*, Shaw.) Head round; no tusks; tail crescent-shaped; skin naked, excessively thick, and of a fibrous nature, like horn. South Seas. Twenty-three feet long.

FAMILY II. CETACEA.

Teeth pointed or obtuse, all of one kind, upon the borders of the jaws; or transverse corneous laminae in the arch of the palate; two anal mammae; spiracles on the top of the head.

1st Division.—*With small head.*

Gen. 149. DELPHINUS, Lin. Cuv. Geoff. Desm.—*Delphinapterus*, Lacep.

Teeth variable in number, of a canine form, sometimes compressed and dentated on their cutting margins, from 200 to none at all; jaws more or less advanced in form of a beak; spiracles with a crescent-shaped aperture; an adipose dorsal fin, or a longitudinal fold of the skin; tail flattened horizontally and bifurcated.

Sub-Gen. 1. DELPHINORHYNCHUS, Blainville. *Snout prolonged, with a long and slender beak; jaws almost linear, with numerous teeth on their margins.*

D. *Geoffroyi*, Desm. Jaws straight, linear, very long; a longitudinal fold of the skin on the back in place of a fin; grayish above, white below. Four feet and a-half long. Coasts of Brazil.—*Mam.* 512.

D. *coronatus*, Desm. Jaws elongated into a very long and pointed beak, the lower surpassing the upper; 24 teeth on each side below, 15 above; a small dorsal fin; colour black. From 30 to 36 feet long. Frozen Ocean.—*Mam.* 512.

D. *Gangeticus*, Desm. (*D. rostratus*, Shaw.) Forehead gibbous; snout very long; upper jaw with 27 or 28 teeth, under one with 30; colour pearly gray. Length 6½ feet. Ganges.—*Mam.* 513.

Sub-Gen. 2. DELPHINUS, Blainv. *Snout prolonged into a beak, broad at its base and rounded at its extremity; jaws furnished with numerous teeth.*

D. *delphis*, Desm. The Dolphin of the ancients. Jaws moderately elongated, and of equal length; 42 to 45 teeth in each jaw, pointed and bent; dorsal fin nearest to the tail; colour black above, fading insensibly to white below. Seas of Europe.—*Shaw*, ii. pl. 229, fig. 1.

The Dolphin is from eight to ten feet in length, preys on various species of the smaller fish, and sometimes even attacks the whale. According to Pliny this animal has an affection for man, and is fond of music; and he relates a very improbable story of one which carried a boy daily for many years across the arm of the sea from Baia to Puteoli to school. In modern times the appearance of the dolphin and the porpoise sporting on the water is held to portend an approaching storm.

D. *tursio*, Desm. Jaws moderately elongated, the lower one largest; 23 teeth on each side above, 21 below; back blackish; belly white. European Seas.—*Mam.* 514.

D. *mcsmarnae*, Desm. Snout compressed; teeth 20 to 23 on each side, strong, obtuse; body very thick. Seas of Greenland.—*Mam.* 515.

D. rostratus, Cuv. Desm. Snout long and slender, not depressed; teeth 22 to 26 on each side of the jaws, conical. Size of the common dolphin. Seas of Europe.—*Mam.* 515.

Sub-Gen. 4. *PHOCÆNA*, Cuv. *No beak; snout short and gibbous; numerous teeth in both jaws; a dorsal fin.*

D. phocæna, Lin. The Porpoise. Body and tail elongated; snout rounded; teeth compressed, from 22 to 25 in both jaws; dorsal fin near the middle of the body; colour blackish above, white below. Four to five feet long. Inhabits all seas.—*Shaw*, ii. pl. 229.

D. Peronii, Desm. Form and size of the porpoise; back bluish-black, the rest of the body bright white.—Seas of Australasia.

D. Commersonii, Desm. Form and proportions of the porpoise; body entirely of a silvery white, with the exception of the extremity of the snout, the muzzle, tail, and fins, which are blackish. A little larger than the porpoise. Off Cape Horn.—*Mam.* 517.

D. gladiator, Lacep. Body and tail elongated; upper part of the head convex; snout rounded and very short; dorsal fin near the neck, and much elevated. Length 23 to 25 feet.—North Seas.

D. grampus, Desm. (*D. orca*, Lin.) The Grampus. Body and tail elongated; snout rounded and short; colour blackish above, white below. Length 25 feet. British Seas.—*Shaw*, ii. pl. 232.

D. griseus, Cuv. Head like that of the porpoise; dorsal fin elevated and pointed, near the middle of the body; colour gray above, fading into white below. Taken near Brest.—*Mam.* 518.

D. globiceps, Cuv. Top of the head very convex; snout rounded; dorsal fin not much elevated, sloping backwards, pectoral fins long and pointed; colour of the back shining black or gray. Eighteen to twenty-one feet long.—*Mam.* 519.

Sub-Gen. 5. *DELPHINOPTERUS*, Lacep. *Head obtuse; snout short; no dorsal fin.*

D. leucas, Desm. Beluga, Shaw. Head like that of the porpoise; teeth short, blunt, nine on each side in both jaws; fin of the back replaced by a slight angular eminence; colour yellowish white. Twelve to eighteen feet long. Northern Seas.—*Shaw*, ii. pl. 232.

An individual of this species was taken in the Firth of Forth in 1815.

Sub-Gen. 6. *HETERODON*, Blainville. *Teeth often one in each jaw, or none; lower jaw larger than the upper.*

D. hyperoodon, Desm. Head convex, terminated by a rounded and flattened beak; no teeth; palate furnished with little points or false teeth; orifice of the spiracles crescent-shaped; colour gray above, whitish below. Twenty-three feet long.—*Mam.* 521.

Gen. 150. *MONODON*, Lin.—*Narwhalus*, Lacep. Cuv.

One or two large tusks in the upper jaw; general form analogous to the dolphins; orifice of the spiracles united on the top of the head; a longitudinal dorsal crest.

M. monoceros, Lin. Body ovoid; head equal to a fourth of the length of the animal; left tusk only developed, furrowed in a spiral form, half the length of the body; colour grayish in the young, marbled or blackish in the old. Length 20 to 30 feet. Northern Ocean.—*Shaw*, ii. pl. 225.

The Narwhal is of an ovoid form, and from twenty to thirty feet long. Its upper jaw, more advanced than the under, is covered by a thick lip, and from each side of this jaw projects a long narrow tusk terminating in a sharp point. This tusk, preserved in the cabinets of the curious, was long conceived to be the horn of the fabulous unicorn. It was afterwards conjectured to be placed upon the forehead of the Narwhal; till later and more correct observation discovered it to be one of two tusks proceeding from the upper jaw of the animal. This tusk or tooth is twisted spirally through its entire length, and is harder than ivory. With this powerful instrument he attacks his prey, and often destroys the whale.

2d Division.—*Head very large.*

Gen. 151. PHYSETER, Lin. Cuv.—*Physalus*, Lacep.

Inferior teeth 18 to 23 on each side of the jaw; upper jaw broad, elevated, without teeth, or with these short and concealed in the gum; lower jaw elongated, narrow, corresponding to a furrow of the upper, and armed with thick and conical teeth, entering into corresponding cavities in the upper jaw; spiracular orifices united at the upper part of the snout; a dorsal fin in some species, a simple eminence in others; cartilaginous cavities in the superior region of the head filled with oily matter.

Sub-Gen. 1. CATODON, Lacep.—*No dorsal fin.*

P. macrocephalus, Desm. Great-headed Cachalot. Lower teeth 20 to 23 on each side, recurved and pointed at the extremity; small conical teeth concealed in the upper gums; tail narrow and conical; a longitudinal eminence on the back above the anus; upper part of the body blackish or slate-blue, a little spotted with white; belly whitish. Length 45 to 60 feet. Northern Seas.—*Shaw*, ii. 228.

The usual length of the *Macrocephalus* is upwards of seventy feet, and its head is the largest of any known animal. It is more than a third the length of the body, truncated in front and almost cubical. The spermaceti, for which it is chiefly killed, is found in membranous cells.

Sub-Gen. 2. PHYSETER, Lacep.—*With a dorsal fin.*

P. microps, Lacep. Lower teeth 21 on each side, arched, the points directed backwards; dorsal fin large, erect, and pointed; pectoral fins large; eyes very small. Length 70 to 80 feet. Northern Seas.—*Mam.* 525.

An individual of this species, fifty-four feet long, was stranded at Cramond Island, in the Firth of Forth, 22d December 1769.

P. sulcatus, Desm. Teeth of the lower jaw pointed and straight, with inclined furrows on each side of the jaw; dorsal fin conical, situated above the pectorals. Seas of Japan.—*Mam.* 526.

Gen. 152. BALÆNA, Lin. Cuv. Desm.—*Balanoptera*, Lacep. No teeth; upper jaw keel-formed, furnished on each side with

whalebone or transverse horny laminæ, slender, serrated, and attenuated at the edges; orifices of the spiracles separated, and placed towards the middle of the upper part of the head; a dorsal fin in some species; nodosities on the back in others.

Sub-Gen. 1. BALÆNA, Lacep.—*No dorsal fin.*

B. mysticetus, Lin. The Common Whale. Body thick; tail short; no hunch on the back; upper jaw furnished with about 700 transverse horny laminæ. Length 80 to 100 feet. Inhabits the Atlantic Ocean and Polar Seas.—*Shaw*, ii. pl. 226.

This is the largest of animals. It is found from 50 to 100 feet long, and is said often to have been taken greatly exceeding this length. The jaws being divested of teeth, their place is supplied in the upper one by corneous laminæ, the whalebone of commerce, and on each side of this jaw there are three or four hundred of these laminæ fixed in the gum, and bristled at the point. The skin of the whale is black and thick, and between this and the flesh is the fat or blubber, from which oil is extracted. The spiracles are placed upon a rising on the top of the head, and they can eject water from these to the height of from twenty to thirty feet. The tail of the whale, terminated by a broad horizontal fin, is strong and flexible, and is the principal agent in the motion of the animal, and its principal arm of defence. The blows with its tail are dangerous to the boats and ships employed in its capture; and some idea may be formed of its force from considering that a large specimen is equal in mass of body to nearly a hundred elephants. Regarding the growth or age of the whale little is known; but since their capture has become an object of commerce, the species seems gradually diminishing in number as well as in size. The female brings forth only one at a time, for which she shows great affection.

B. glacialis, Klein. Lower jaw rounded, high, and broad; tail elongated; no hunch on the back; general colour gray; a large oval space under the head of a shining white, with some blackish spots around and in the centre. Inhabits the North Atlantic Ocean.

B. nodosa, Desm. A hunch on the back, situated near the tail; pectoral fins white, long, and distant from the snout.—*Mam.* 527.

B. gibbosa, Desm. Five or six hunches on the back, near the tail; whalebones white.—*Mam.* 528.

Sub-Gen. 2. BALÆNOPTERA, Lacep.—*With a dorsal fin.*

B. gibbar, Desm. (*B. physalus*, Lin.) Jaws pointed and equal; whalebones short, bluish; no folds under the throat or belly; body brown above, white below. Size of the common whale. Arctic Seas.—*Mam.* 528.

B. boops, Lin. Neck elevated and rounded; snout projecting, broad, and a little rounded; longitudinal folds under the throat and belly; semispherical tuberosities before the spiracles; dorsal fin curved backwards. Fifty-four feet long. Inhabits Northern Seas.—*Desm. Mam.* 528.

M. Cuvier suspects that the *B. rostrata* of Hunter, and the *B. musculus* of Linæus are only varieties of this species.

CLASS II.—BIRDS. (*Aves.*)

Vertebrated animals, with red and warm blood, respiring by lungs, and the young of which are produced from eggs. Body covered with feathers, and general conformation organized for flying.

ARISTOTLE and Pliny, the fathers of Natural History, are almost the only writers of antiquity who have attempted to detail the manners or distinguish the species of Birds; the former in his History of Animals, and the latter in the tenth book of his Natural History. After the revival of letters, Pierre Belon in 1553, and Conrad Gesner in 1555, each published a work on Birds. In Belon's work, a thin folio with wooden cuts, these animals are classed by their manners, or characterized by the places where they are found. Thus the Birds of Prey form the first class, the Waders the second, the Swimmers the third, and the birds which nestle in trees or on the ground the fourth. Gesner's Treatise on Birds forms the third volume of his History of Animals, and is also adorned with engravings on wood. Besides alphabetical tables of the names of birds in all the known languages, and descriptive characters, his work contains references to all the writers within the compass of his knowledge who had noticed this interesting class of animals.

Aldrovandus, a physician of Bologna, published a system of Ornithology in 1599, in which, following Belon, he classed the birds according to the places which they frequented, and the nature of their food, but added a great number of new descriptions. It is illustrated with wooden cuts, which, however, are in general inaccurate representations. Johnston followed in 1657 with a condensed compilation of all that had been done before him. The figures, however, being engraved on copper, are many of them above mediocrity.

Francis Willoughby, an English gentleman, who had paid great attention to Natural History, and whose System of Ornithology was published under the superintendence of the celebrated Ray in 1678, after its author's death, may be regarded as the first systematic writer on this subject. This excellent work is

divided into three books, the first of which treats of Birds in general; the second of Land Birds; and the third of Water Birds. The land birds are further arranged into groups which possess a crooked beak and talons, and those which have the bill and claws nearly straight. The water birds are separated into three families, viz. 1. Those that wade in the water, or frequent watery places; 2. Those that are of “a middle nature, between swimmers and waders, or rather that partake of both kinds, some whereof are cloven-footed, and yet swim; others whole-footed, but yet very long legged, like the waders;” and 3. the palmated birds, or those “that swim in the water.” The minor subdivisions are equally characterized by sound judgment and acute observation.

The Ornithology of Willoughby and his friend Ray had the same happy effect on the progress of the science, as Ray's *Synopsis Animalium* had on another great department of zoology; and it is no small praise to their sagacity that this work furnished the basis of the classification adopted half a century afterwards by Linnæus. Ray in his *Synopsis Methodica Avium*, a posthumous work published by Dr Derham in 1713, but entirely finished before the author's death, still farther improved the same system.

From the date of this publication till the appearance of the *Systema Naturæ* of the great Linnæus, little progress was made in the science of ornithology. M. Barerre, a Frenchman, who published a system in 1741, showed it was possible even to retrograde; nor were the attempts of Frisch, a German naturalist, who commenced a Natural History of Birds in 1734, much calculated, though his figures be exact, to forward its progress. Jacob Theodore Klein, who published a work on birds in 1750, and whose ambition was to be considered as the rival of Linnæus, was still less successful in his confused attempt to improve the classification of birds.

In the *Systema Naturæ* of Linnæus the Class of Birds is divided into six Orders, viz.

- I. ACCIPITRES, Birds of Prey. Bill bent; upper mandible dilated on each side, or armed with a tooth; legs short, robust; toes warty; claws crooked and pointed.
- II. PICÆ. Bill convex or rounded above, edged on its lower part; legs short, robust; toes smooth.
- III. ANSERES. Bill smooth, covered with an epidermis and thickened

at its point; feet for swimming; toes palinated, or united by a membrane.

IV. GRALLÆ. Bill almost cylindrical; legs formed for wading; thighs half naked.

V. GALLINÆ. Bill convex, with the upper mandible arched over the under; feet formed for walking; toes rough below.

VI. PASSERES. Bill conical, pointed; legs formed for hopping, slender, and with the toes divided.

If in his arrangement of birds Linnæus deserves the acknowledgment of all the future students of ornithology, his determination of the genera, and his creation of terms to make his descriptions more certain, render his labours of double value. The terminology of Linnæus was extended by Forster in his *Enchiridion*, and improved by Illiger. The thirteenth edition of the *Systema Naturæ* by J. F. Gmelin, including many new species, appeared in 1788.

Linnæus was followed as a systematic writer by Brisson in 1760. This able writer's *System of Ornithology*, still in estimation for its minute accuracy of description, is in six quarto volumes, containing 220 engravings. About 1300 species of birds are described, grouped into twenty-six orders and 113 genera, the characters of which are taken from the feet, bill, and feathers. J. Ch. Schæffer published in 1774 his *Elementa Ornithologica*, in which birds are divided into two families, *Nudipedes* and *Plumipedes*; and J. Ant. Scopoli, in his *Introductio ad Historiam Naturalem*, 1777, also arranges the birds in two great families, the first of which he terms *Retipedes*, or with the skin of the legs divided by small polygonal scales; and the second *Scutipedes*, or those which have the fore part of the legs covered with segments or unequal rings terminated on each side in a longitudinal furrow. The first part of Buffon's work which treats of birds appeared in 1771, distinguished by the same want of arrangement which characterized his previous volumes, and the same enthusiastic eloquence. The work was completed in 1783.

Among the systematic writers who have followed Linnæus, our countryman, Latham, deserves a distinguished place. In 1781 he published a *General Synopsis of Birds*, followed by two supplements, the one in 1787, and the other in 1801, and each genus is illustrated by at least one coloured figure. His *Index Orni-*

thologicus, a convenient abridgement of his larger work, was published in two volumes quarto in 1790.

It would be impossible in the limits of a short notice to give a detailed account of the numerous works connected with ornithology which appeared previous and subsequent to the works of the systematical authors now mentioned. Hernandez and Marcgrave figured many of the birds of Mexico and Brazil; Sir Hans Sloane, in his *History of Jamaica*, has represented forty-four species; and many of the birds of Carolina and Florida are excellently described by Catesby. The birds of Africa have been splendidly illustrated by Vaillant; and the Tanagers, Todiers, and Manakins by Desmarest; Wilson in his *American Ornithology* has done much to illustrate the feathered races in that vast continent; and his able follower in that branch of science, Charles Bonaparte, promises to complete our knowledge of American birds. Edwards, in his *Natural History of Birds*, and in his *Gleanings of Natural History*, has given many excellent figures; and Dr Shaw in his *General Zoology*, continued by Mr Stephens, has made known to the English reader a great many interesting species. A number of other British writers have contributed to illustrate this interesting branch of natural history, such as Pennant in his *British Zoology*, Lewins in his work on *British Birds*, Bewick, Montague, Donovan, and very recently Mr P. J. Selby, in his splendid work entitled *Illustrations of British Ornithology*. A work on *General Ornithology* by the same gentleman and Sir William Jardine, Bart. may also be mentioned as now in progress. For other writers we must refer to the list of the principal works on ornithology at the end of this volume.

In the *Encyclopedie Methodique* the Abbé Bonnaterre divides Birds into twelve classes, after the structure of the feet, and 112 genera, characterized from the form of the bill and other minor distinctions.

Professor Blumenbach, in his *Manual of Natural History*, published in 1807, arranges the Class of Birds into nine Orders, viz.

- (A.) LAND BIRDS.
- I. ACCIPITRES,
- II. LEVIROSTRES,
- III. PICI,
- IV. CORACES,
- V. PASSERES,

- VI. GALLINÆ,
- VII. STRUTHIONES.
- (B.) WATER BIRDS.
- VIII. GRALLÆ,
- IX. ANSERES.

Baron Cuvier, in his *Regne Animal*, published in 1817, preserved all the orders of Linnæus, with the exception of that of *Picæ*, replacing it by his order *Scansores* for birds which have two toes before and behind, and classing the others among his *Passeres*. His arrangement in the *Regne Animal* stands thus :—

- I. ACCIPITRES, divided into Diurnal and Nocturnal.
- II. PASSERES, divided into Dentiostres, Fissirostres, Conirostres, Tenuirostres, and Syndactyli.
- III. SCANSORES, or Climbers.
- IV. GALLINÆ, or birds resembling the domestic cock.
- V. GRALLÆ, or Waders, divided into Brevipennes, Pressirostres, Culirostres, and Macroductyles.
- VI. PALMIPEDES, divided into Brachypteri, Longipennes, Totipalmes, and Lamellirostres.

M. de Lacepede also published a method in 1799, dividing the birds into forty orders; and M. Constant Dumeril in 1806, in his *Zoologie Analytique*, comprises them in six. Meyer and Wolf, in their work on German Birds, (1810,) make nine orders of this class; and Illiger in 1811 divides them into seven orders, forty-one families, and 147 genera.

M. Vieillot, a celebrated French ornithologist, and the author of the splendid work on the Birds in the French Museum, gave a methodical arrangement of birds in the 24th volume of the *Nouveau Dictionnaire d'Histoire Naturelle*, in which the Class is arranged into five orders.

- I. ACCIPITRES, divided into DIURNAL and NOCTURNAL; and containing four families, viz. Vulturini, Gypæti, Accipitrini, and Ægoli.
- II. SYLVICOLÆ, divided into two tribes, viz. ZYGODACTYLI and ANISODACTYLI, and thirty families. The families of the first tribe are Psittacini, Macroglossi, Aureoli, Pteroglossi, Barbati, Imberbi, and Frugivori; of the second, Granivori, Ægithali, Pericalles, Textores, Leimonites, Carunculati, Paradisei, Coraces, Baccivori, Chelidones, Myiotheres, Colluriones, Canori, Aneropontes, Anthomyzi, Epopsides, Pelmatodes, Antriades, Prionoti, Lyriferi, Dysodes, Columbini, and Alecrides.
- III. GALLINÆ, two families, viz. Nudipedes and Plumipedes.
- IV. GRALLATORES, divided into two tribes, viz. DI-TRIDACTYLI and TETRADACTYLI, and fifteen families. To the first tribe belong the families Megisthanes, Pedionomi, Ægialites; to the second, Helonomi, Falcirostres, Latirostres, Herodiones, Aerophoni, Coleoramphi, Uncirostres, Hylebates, Macronyches, Macroductyli, Pinna-tipedes, and Palmipedes.

V. NATATOIRES, divided into three tribes, viz. TELEOPODES, ATELEOPODES, and PTILOPTERI. The first tribe includes the families Syn-dactyli, Urinatores, Dermorynchi, and Pelagii; the second, Siphorini and Brachypteri; the third Sphenisci.

Mr N. A. Vigors, in a paper in the 14th volume of the Lin-næan Transactions, founding upon a principle discovered by Mr Macleay, the author of *Horæ Entomologicæ*, proposed a new arrangement of birds, according to their natural affinities. "I discovered (says he) as I advanced, that the larger or primary groups were connected by an uninterrupted chain of affinities; that this series or chain returned into itself; and that the groups of which it was composed preserved in their regular succession an analogy to the corresponding groups or orders of the contiguous classes of zoology. I equally detected the existence of the same principle in most of the subordinate divisions, even down to the minutest, to a degree at least sufficiently extensive to afford grounds for asserting its general prevalence." P. 399.

This chain of affinities, Mr Vigors conceives, takes always a quincunx form; so that in the class of Birds, if the five orders into which he arranges them, viz. Raptores, Insessores, Rasores, Grallatores, and Natatores, were placed in connected circles, round a common centre, they would be found to be mutually connected together.

INSESSORES.

RAPTORES.

RASORES.

AVES.

NATATOIRES. GRALLATOIRES.

The same connection is found to take place between the minor subdivisions, when arranged in a similar form. For instance, in his second order INSESSORES, composed of five tribes, the arrangement stands thus :—

CONIROSTRES.

DENTIROSTRES.

SCANSORES.

INSESSORES.

FISSIROSTRES.

TENUIROSTRES.

Each of these tribes again is further divided into five families, which, when placed in the same order, are found to be similarly connected.

As a further confirmation of Mr Vigors's theory, it may be

remarked that Professor Blumenbach long since noticed the same principle as applicable to the arrangement of the feathers of birds on the skin, which he observed always to follow a quincunx order.

This arrangement according to natural affinities is certainly curious, and affords room for hoping, should the principle be ascertained to pervade the families of animals very universally, that a more philosophical classification of the objects of nature may in time be perfected. But in the meantime we consider any such arrangement as merely theoretical, and that it would require all the species to be known, and the individuals examined, both with regard to their external appearance and internal structure, before such a method could be completed. The theory is however very ingenious, and deserves the consideration of naturalists.

Finally, M. C. J. Temminck, in his *Manuel d'Ornithologie*, the first edition of which was published in 1815, and the second in 1820, divides the class of Birds into sixteen orders, and numerous minor subdivisions. This gentleman, with opportunities beyond most others, in the possession of a splendid museum, of comparing birds, particularly the European species, at all ages, and in every stage of plumage, has rendered the knowledge of the class more precise, by referring to one species many individuals which had been characterized by preceding ornithologists as distinct, from having examined only young or imperfect specimens.

The arrangement of Birds into Orders has for its basis the conformation of the bill and feet, which are adopted to their different modes of living and food. Birds of Prey are characterized by a hooked bill, and feet armed with strong and crooked nails; Climbers are those the structure of whose feet is calculated for motion on an inclined or vertical surface; and web-footed birds are evidently adapted for swimming. Others again have the legs very long and naked for wading; and a large number, with the claws short and feeble, live chiefly on insects. But though it be thus easy to separate the more strongly marked groups into extended families, yet it has been found extremely difficult to distribute them in subordinate groups, so as to facilitate the knowledge of species in a class so widely extended. In adopting the

arrangement of Temminck, therefore, though his Orders are more numerous than those proposed by Cuvier and Vieillot, yet the Families of the latter are in much greater number; and in an elementary work it has been judged proper to follow that system which involves the least change of the established nomenclature as likely to be most generally useful. Temminck divides the Class of Birds into sixteen orders, viz.

- I. RAPACES. Birds of Prey.
- II. OMNIVORES. Omnivorous Birds.
- III. INSECTIVORES. Birds which feed on Insects.
- IV. GRANIVORES. Birds which feed on Grains.
- V. ZYGODACTYLI. Birds with two toes before and two behind.
- VI. ANISODACTYLI. Birds which have the exterior toe joined to the middle one at the base.
- VII. ALCYONES. Birds with three toes before, united, and one behind; the tarsi very short.
- VIII. CHELIDONES. Birds with short legs, three toes before, divided, or only united at the base by a short membrane; the back toe often reversible.
- IX. COLUMBÆ. Birds with three toes before, entirely divided, and one behind.
- X. GALLINÆ. Birds with three toes before, united by a membrane; the back toe joined to the tarsus above the joint of the other toes.
- XI. ALECTORIDES. Birds with the tarsus long and slender; three toes before and none behind; the articulation of the posterior one higher than those before.
- XII. CURSORES. Birds with long legs, naked above the knee, with two or three toes directed forwards.
- XIII. GRALLATORES. Birds with long and slender legs, more or less naked above the knee; three toes before and one behind, the posterior one jointed on the same level with the others or more elevated.
- XIV. PINNATIPEDES. Birds with feet of medium length; tarsi slender or compressed; three toes before and one behind, with a rudimentary membrane along the toes; the posterior one joined interiorly on the tarsus.
- XV. PALMIPEDES. Birds with short feet, more or less drawn up to the abdomen; anterior toes partly or wholly connected by a membrane; the posterior toe articulated interiorly upon the tarsus, or totally wanting in some genera.
- XVI. INERTES. Birds with feet retracted into the abdomen; three toes divided, before; the posterior toe short, articulated interiorly.

Birds support themselves and direct their flight in the air nearly in the same manner as fishes do in the water. But they

are also calculated for motion on the ground ; some families for motion on the surface of the water, or even to a certain degree through a mass of the same element ; and their structure is varied to suit these different kinds of motion.

The part of the spine in birds which corresponds to the back is immoveable, and the only portions of the vertebral column capable of motion are the vertebræ of the neck and those of the tail. Their pectoral members or arms are elongated to wings proper only for flight. These members or wings, composed of one long finger and the vestiges of two others, are furnished with long, stiff, but elastic feathers, disposed like a fan, which follow the movement of the bone, and when extended occupy a large surface. The wings are attached by a double clavicle, and are supported by a broad sternum, carinated in front like the keel of a ship. This sternum is formed of five pieces, strongly joined together ; and the greater or less ossification of these pieces is always relative to the powers of the bird for flight. The long feathers, attached to what may be termed the hand, generally to the number of ten, are termed *primaries* ; the *secondaries*, variable in number, are those attached to the fore-arm ; and *scapulars* are the smaller feathers which are attached to the humerus. In describing birds the term *remiges* is also used to denote the feathers of the wings which serve as oars ; and *rectrices* those of the tail, which have been considered to act as a rudder. The smaller feathers which cover the base of the wing and tail are termed *tectrices*.

The anterior extremities, destined to support them in flight, can neither be used for prehension nor support, and birds thus take objects from the ground by their mouth. The neck is elongated, and the body thrown forward, that the bill may easily reach the ground. The pelvis is lengthened to furnish an attachment for the muscles which support the trunk upon the thighs ; and there is an arrangement of muscles going from the pelvis to the toes, in such manner that the weight of the animal bends the toes, and enables it to sleep perched upon one foot.

The bony part of the tail is short, but it carries a row of strong feathers which spreading contribute to support the bird. The number of these feathers is generally twelve, sometimes

fourteen, and in the Gallinæ eighteen. The legs have a femur and a tibia, and the tarsus and metatarsus are represented by a single bone. The toes are attached to the tarsus, and are generally three before and a kind of thumb behind, which, however, is sometimes wanting. In the swallow it is directed forwards. In the climbers, on the contrary, the external toe and the thumb are directed backwards. The number of joints increases in each toe, counting from the thumb, which has two, to the external toe, which has five. Birds with the toes entirely free are adapted to walk or hop on a horizontal surface, such as the domestic fowl. Others with two toes behind and two before, such as the parrot, walk with difficulty, but climb with facility; and others again, such as ducks and swans, with the toes united by a membrane, are chiefly calculated for motion in water.

The bill in birds is covered with a corneous substance, and as these animals swallow their food without mastication, they are not furnished with teeth. The upper mandible is formed chiefly of the intermaxillary bones, prolonged behind into two arches, of which the internal is composed of the palate bones, and the external of the maxillary and jugal bones; and this mandible is united to the cranium by elastic laminæ. The bill is constructed less for bruising the food than for seizing and dividing it; and thus from the greater solidity and length of this organ the nature of the food may be inferred.

The bill or beak is sometimes furnished at its origin with a fleshy or membranous caruncle, which is called the *cere*; and sometimes the beak is prolonged upon the forehead into a kind of horn or helmet, as in the Calao. The two mandibles, moveable upon one another through the medium of an intermediate bone placed at the articulation, is a distinguishing anatomical character in the structure of the jaws of birds.

The quills and feathers are composed of a bearded or webbed stem hollowed at its base; these webs or horizontal feathers are again themselves webbed by still smaller ones; and the texture, the strength, lustre, and general form of these feathers are infinitely varied. The feathers fall off twice a-year, and this change of plumage is termed *moulting*. In some species the winter plumage differs from that of summer, and in the

greater number the female differs from the male in her colours being less bright. The young generally resemble the female.

The brain of birds has the same general characters as that of the other oviparous vertebrated animals, but is distinguished by its proportionally greater volume, which often exceeds that of the Mammalia. But this apparent magnitude is caused by tubercles analogous to the *corpora striata*, and not by the hemispheres, which are very small and without circumvolutions. The cerebellum is of considerable size, without lateral lobes, and almost completely formed by the vermiform process.

The *trachea* or windpipe in birds is formed of complete rings. At its bifurcation is a glottis provided with muscles, termed the inferior larynx. This is the organ which produces the voice of birds; and it is afterwards modified by the length, breadth, and elasticity of the trachea and its orifice in the throat. The upper larynx is simple.

The cavity of the thorax is not in Birds separated by a fleshy partition from the abdomen. The lungs adhere to the spine, and communicate with many membranous sacs situate in the abdomen, under the axilla, and even in the cavities of the larger bones, the substance of the bill, and in the fistulous portions of the quills. The great quantity of air which birds respire appears to have effect upon all their motions. They respire, it may be said, as well by the branches of the aorta as by those of the pulmonary artery. It is believed that the temperature to which the bodies of birds is raised in hatching, and the great muscular force which they sometimes exert in almost continued flight for many days, depends upon the action of the air upon the blood.

Birds, like all the other vertebrated animals, possess five senses; but in this class that of touch is the least perfect. Their feathers prevent them from receiving by immediate contact the impressions of the objects which they touch; and their feet are enveloped in corneous laminae or scales, which materially blunt sensation. All enjoy the organ of sight, and by a particular mechanism in the structure of the eye they are enabled to perceive objects at a distance with the same facility as when near the body. Besides the two ordinary eyelids there is always a third semitransparent one placed at the internal angle of the

eye, which, by the assistance of a remarkable muscular apparatus, may be drawn before the eye like a curtain. The cornea is very convex. Although birds have no external cartilaginous ear, all appear to enjoy the faculty of hearing. Some of the nocturnal birds have the auditory opening surrounded by feathers. The organs of smell are concealed in the base of the bill, and the breadth of the nasal openings determine their form. The sense of smell in the vulture and the raven has been said to be so very acute, that they can smell carrion at an immense distance; but this from recent observation seems doubtful. The tongue in birds is supported by a production of the hyoid bone. The taste is not very delicate.

Digestion in birds is in proportion to the activity of their life, and the quantity of their respiration. The stomach is composed, first of the *crop*, which is a dilatation of the œsophagus at the base of the neck. The food remains in this duct for some time, and there imbibes a fluid analogous to the saliva, which is secreted from the inside of the canal. When softened by the action of heat and moisture it passes by little and little into a strong muscular bag called the *gizzard*, where the food is triturated the more easily, that many species swallow little stones to increase the effect. This gizzard, it has been remarked, is strongest in birds which have slender bills, and which are of course unable to break down their food; in those which feed on flesh or fish the muscles are much weaker, and the stomach almost membranous. By the outlet of this stomach the food, reduced to a species of chyme, flows through the remainder of the intestinal canal, where the nutritious parts are absorbed, and the remainder expelled by a *cloaca*, an orifice common to the urinary and genital organs.

Birds, such as the partridge and common fowl, whose young are able to walk and feed themselves on their departure from the egg, do not generally live in pairs. One male serves many females, and the young are entirely trusted to the maternal care. The greater part of birds, however, are blind and helpless at their birth, and their parents are therefore under the necessity of providing for their subsistence. Pigeons disgorge half-digested grains to feed their young; and linnets bring them larvæ of insects or the soft parts of other animals. These live always

in pairs, construct their nest with great care, and constantly in the same manner; and each species appropriates for this purpose certain materials. All possess a kind of instinct which leads them to choose the most convenient places for their nests, such as best afford concealment, or which render them inaccessible to their enemies.

In Birds the ova exist already formed in the mother before fecundation; and it is not a rare occurrence to see eggs laid without impregnation, similar in every respect to those which produce young. Fecundation in most of the species is accomplished by mere juxtaposition. The eggs of birds differ much in the colour of their calcareous covering. They have generally the form of an elongated ball, and one of their extremities is thicker than the other. The fecundated eggs require a certain heat to be hatched; and the observation of this fact has led to the practice in Egypt and elsewhere, of hatching large broods of chickens by artificial heat.

The class of Birds, though not so apparently useful to man as the Mammalia, serve important purposes in the general economy of nature. Those whose food is chiefly insectivorous check the excessive reproduction of the insect races, and for this purpose migrate at certain seasons to places where their food abounds. The indiscriminate destruction of crows and sparrows in some districts has accordingly been found to give rise to an infinitely more prejudicial multiplication of creatures still more destructive. Some families of birds destroy field-mice, snakes, frogs, and lizards; and others again are led by choice to feed on carrion, or dead animal matter. Birds are besides extensive agents in the spread of vegetables and even animals. It is well ascertained that wild ducks in their emigrations carry impregnated spawn into remote ponds, and thus stock them with fish; and many by swallowing seeds whole, and subsequently expelling them, are the means of spreading vegetation over an extent of surface which scarcely any other means could accomplish. A great portion of the class and their eggs may be used as food, and the feathers of many form an object of commerce.

Nothing is more singular in the history of birds than their periodical migrations. That these are connected in some measure with the necessity of a supply of food and the impulse of repro-

duction is almost demonstrable ; but the instinctive feeling which guides them without compass across seas and continents, and enables them to migrate at certain periods, corresponding with the production of their food in distant countries, can only be referred to one Great Source.

Who bade the stork, Columbus-like, explore
Heavens not his own, and worlds unknown before ?
Who calls the council, states the certain day ?
Who forms the phalanx, and who points the way ?

The flights of migratory birds have been noticed from the earliest periods ;—“ The stork in the Heaven knoweth her appointed times, and the turtle and the crane and the swallow observe the time of their coming.” And, as if their passage through the air or the structure of their bodies made them sooner perceive the incipient changes of weather, the appearance and cries of birds have long been considered to afford presages of the coming storm or the cessation of the tempest. The institution of a College of Augurs at Rome may therefore be conceived to have reference to something better than mere superstition ; and though the flight of particular species might, in the hands of interested individuals, be made to presage the wished-for result of a battle, or direct a march already determined on, yet, in the absence of the barometer and thermometer, the appearance or disappearance and cries of birds were the signals for the husbandman to sow his fields or to secure his crop.

Jam veris prænuncia venit hirundo.—Ovid.

Now comes the swallow, harbinger of spring.

Tum cornix plena pluvium vocat improba voce.—Virg.

The crow with clamorous cries the shower demands.—*Dryd.*

In this country the great migrations of birds take place in spring and autumn. Those which arrive in spring come from warmer climates, and after incubation leave us in autumn ; and another host, chiefly Palmipedes, from the arctic regions, arrive in autumn, pass the winter on our lakes and shores, and depart again in the spring. Each species has a particular mode of flight in these annual journeys, and a certain period of arrival and departure. Assembled in large flocks the cranes cleave the air in the form of a long triangle ; wild-geese fly in angular lines ; and the smaller birds associate in less numerous families, and reach their destination by less continued flights.

One of the most curious particulars connected with the annual migrations of birds is the circumstance of individuals returning for a series of years to the same nestling-places. Spallanzani having tied a thread of red silk round the leg of a swallow which built its nest in his window, saw for three seasons the same stranger with its progeny annually appear; Ekmark remarked a lame starling which occupied the same nest in the hole of an old alder for a period of eight years; and similar instances are on record concerning many other species of migratory birds. This wonderful direction of instinct, which divides the innumerable flocks of birds in their progress northward, and leads particular families to seek the protection of the same roof, or the same chimney-top which formerly sheltered them, affords a subject not the least worthy of contemplation, among the thousand instances of wisdom and beneficence which arrest the student of Nature at every step of his progress.

The flight of birds is very rapid. Birds of prey have been observed to fly at the rate of about twenty leagues in an hour. A falcon belonging to Henry II. of France escaping from Fontainebleau, was found next day at Malta, a distance of 1350 miles, and recognized from the ring on its leg. Sir Hans Sloane mentions that at Barbadoes the gulls came to feed and returned two hundred miles in the same day. And Mr Audubon relates of the migratory pigeons of America, that they have been killed in the neighbourhood of New York with rice in their crops, collected in the fields of Georgia and Carolina, the nearest points at which this supply could have been obtained. Reasoning from the fact that the food of pigeons is entirely digested in twelve hours, Mr Audubon concludes that they must have travelled between 300 and 400 miles in six hours.

Birds in general live long, considering how early they arrive at maturity. Swans are said to live for a hundred years; and the pelican arrives at a similar age. Carnivorous birds, particularly the eagle, live to a very great age, perhaps beyond a century; the raven for a still longer period; and parrots have been known to live from sixty to eighty years. The life of Gallinaceous birds, such as the domestic fowl, the pheasant and the partridge, seldom exceeds from twelve to twenty years.

ORDER I.—RAPACES.

BILL short, strong ; upper mandible covered at its base by a membrane or cere, compressed on the sides, and hooked towards its extremity ; nostrils open ; legs strong, muscular, short, or of medium length, feathered to the knee or toes ; toes three before and one behind, divided, or united at the base by a membrane, rough below, armed with powerful claws, sharp, retractile, and hooked.

The birds comprised in this order bear a relation in their mode of life to the Carnivora among the Mammalia. Almost all of them live on animal food. Some take their prey alive ; others clear the ground of the noxious remains of dead animals ; others feed on fishes and reptiles ; and a few species live chiefly on insects. Those which pursue their prey by day have hence been termed *diurnal* birds ; others flying only in the twilight, have been denominated *nocturnal*. The females are always larger than the males. The number of their eggs seldom exceeds four.

Gen. 1. VULTUR, Illiger, Tem.

Bill thick and short, deeper than broad, its base covered by a cere ; upper mandible straight, bent towards the point ; under mandible straight, rounded, and inclined at the point ; head naked, or covered with a short down ; nostrils naked, lateral, opening diagonally towards the edge of the cere ; legs strong, furnished with slightly bent claws ; the middle toe longest, and united with the exterior one at the base.

These birds, feeding on carrion, are of service in removing dead animal remains. Their figure is as disgusting as their habits. The conformation of their toes and nails deprive them of the power of attacking or carrying off living prey. They fly slowly, and walk heavily, but their sight is acute ; and, though some naturalists have asserted their sense of smell to be so acute as to guide them at great distances to their food, yet there is reason to think that this faculty has been much overrated.

V. cinereus, Lin. Posterior part of the head and neck naked, and of a bluish colour, the rest of the neck covered by a fawn-coloured down ; cere bluish flesh-colour ; tarsus half feathered, its naked part round the toes of a pale blue ; the claws black. About $3\frac{1}{2}$ feet long. Inhabits the mountains and forests of Europe.—*Tem.* 4.

Vultur Bengalensis, Gmel. Lath. ; Grand Vautour, Buff. ; Le Vautour noir d'Egypte, Savigny.

V. fulvus, Lin. Head and neck furnished with a white down ; lower part of the neck surrounded by rows of long slender feathers of a reddish white colour ; a spot on the middle of the breast, covered with a white down ; body and wings fawn-coloured ; flag and tail-feathers of a blackish brown ; beak livid yellow ; cere flesh-coloured ; iris hazel-coloured ; legs gray. About four feet long. Inhabits the mountainous parts of the north of Europe, Africa, and Asia.—*Shaw*, vii. pl. 11.

V. leucocephalus, Meyer ; *V. pernopterus*, Daud. ; *V. trencalos*, Bechst. ; *Le Griffon*, Buff.—The young, *V. Kolbii*, Lath. ; *Le Vautour chasse-fiente*, Vaill.

V. monachus, Tem. Plumage dull brown ; quill-feathers black ;

top of the head around the eyes and ears and the fore part of the neck naked and reddish ; occiput, hind part of the neck, and crop covered with short ashy down ; tarsi feathered a little below the knee ; feet yellowish. Two feet three inches long. Inhabits western coast of Africa.—*Shaw*, vii. pl. 7, 8, 9.

V. Ponticerrianus, Lath. Bill short and much hooked, with its base covered by a naked skin ; feet short and strong, the nails crooked ; head and neck naked, or covered in part by short down ; a thin naked red-coloured membrane on the neck ; head, neck, and breast flesh-coloured ; back, belly, wings, and tail black ; iris red ; bill black ; feet yellowish. Inhabits India. Size of a large goose.—*Shaw*, vii. pl. 10.

V. Indicus, Lath. Back brownish-coloured, terminated by a band of a clearer colour ; large feathers of the wing and tail black ; head covered with a tuft resembling hair ; neck with little tufts at small distances ; feathers of the breast short, like hair ; iris red ; feet and bill black. Inhabits India. Size of a goose.—*Shaw*, vii. 26.

GEN. 2. CATHARTES, Illiger, Tem.—*Vultur*, Lin.

Beak long, compressed, straight, bent towards the point ; cere naked, covering more than half of the beak ; upper mandible tumid towards the point ; head oblong, naked, as well as the upper part of the neck ; nostrils in the middle of the bill, near the ridge of the upper mandible, longitudinally cleft, broad, sometimes surmounted by fleshy appendages ; legs with tarsus naked, more or less slender ; middle toe long, and united to the exterior one at the base.

C. perenopterus, Tem. (*Vultur perenopterus*, Lin.) The Egyptian Vulture. Head and fore part of the neck covered by a naked skin of a livid yellow colour ; plumage white, except the large feathers of the wings, which are black ; feathers of the occiput long and slender ; the cere and bill orange ; iris yellow ; feet of a livid yellow, claws black, tail raised. Young specimens of a deep brown variegated by yellowish brown spots ; the cere and feet of a gray ash-colour. About two feet and a-half long. Inhabits the Pyrenees, Switzerland, and Africa.—*Tem*. 9.

V. leucocephalus, Lath. ; Vautour blanc, Buff. ; Rachamach, Bruce ; Vautour d'Egypte, Son. ; Percnopterus, Cuv. ; the Ash-coloured and Alpine Vulture of Latham. The young, *V. fuscus*, Gmel. ; Le Vautour de Malte, Buff. ; Maltese Vulture, Lath.

These birds feed chiefly on carrion and filth, and their use in removing these offensive objects and destroying reptiles occasions their being protected in some countries of the east, particularly in Egypt, where they were anciently held in such veneration, that any person who destroyed them was punished with death. At this day immense flocks of them are found in all the principal towns of Egypt, Syria, and Persia, mingling with other animals of similar propensities. They feed with the greatest familiarity even in the streets of the most populous towns. At Cairo their skins are sold, and converted into dresses.

C. gryphus, Tem. The Condor or Great Vulture of the Andes. Colour blackish ; a spot on the wings, and ruff white ; upper caruncle large, and without dentations ; another under the bill like the cock ; female destitute of caruncles. Inhabits South America.—*Shaw*, vii. pl. 2, 3, 4.

This animal is the largest of the tribe. According to Humboldt it is about three feet three inches in length, and eight feet nine inches in spread of wings ; though Marco Polo asserts that it can raise an elephant from the ground. The usual residence of these birds is in lofty rocks in the regions of the Andes, near the boundary of perpetual snow ; but they are capable of soaring beyond the reach of human vision. In Peru and Quito they are not unfrequently taken alive in the following manner : A cow or horse, which is of little value in those countries, is killed, and exposed ; and in a short time the Condors are seen suddenly to emerge from quarters where their existence was not even suspected. They always begin with the eyes and tongue, and then proceed to devour the entrails, &c. When gorged they are too heavy and indolent to fly, and the Indians easily capture them in nooses. They make their nests in the most inaccessible rocks, and the female lays two white eggs, which are larger than those of the turkey-hen.

C. Papa, Lin. King of the Vultures. Of a whitish rufescent hue ; head and neck naked ; nostrils furnished with a loose orange-coloured caruncle, and the neck with a gray ruff.—*Shaw*, vii. pl. 13.

This bird inhabits the plains in the warmer regions of South America, and it is also said of the West Indies. It lives on rats, lizards, snakes, carrion, and all sorts of excrementitious matters, exhaling a most offensive odour, which the stuffed skin has been known to retain for upwards of twenty years.

C. aura, Lin. American or Carrion Vulture. General colour blackish, with purple and green reflections ; head and neck red, naked, papillous, and wrinkled. About two feet and a-half long. Inhabits America.—*Shaw*, vii. 36.

C. vulturinus, Tem. (*V. Californianus*, Shaw.) Plumage black, with a whitish bill ; head and neck naked and of a pale colour ; feathers of the collar and breast lanceolate ; legs and toes black.—*Shaw*, vii. 10.

Gen. 3. GYPAETUS, Storr.—*Phène*, Vieill.

Bill long ; upper mandible arched towards the point, and bent like a hook ; nostrils oval, covered with stiff hairs directed forwards ; feet short ; four toes, the three anterior united by a short membrane, the middle one very long ; nails slightly crooked ; wings long.

The Gypaeti have more grace and activity in their motions than the vultures. Formidable by their strength and the impetuosity with which they dart on their prey, they seize the moment when a wild goat or its young separates from the flock on the borders of precipices, and kill it on the spot. Young and diseased animals are their common prey.

G. barbatus, Cuv. (*Vultur barbatus*, Lath.—*Falco barbatus*, Gm.)

The Bearded Vulture. Head and neck of a dirty white ; a black line extends from the base of the bill to above the eyes ; another rising behind the eyes passes over the ears ; lower part of the neck, breast, and belly of an orange-red ; back and wing-coverts of a deep grayish brown, but on the centre of each feather is a white longitudinal line ; wings and feathers of the tail of a gray

ash-colour, the ribs white ; tail long, much raised ; bill and claws black ; feet blue ; iris orange ; eyes surrounded by a red line. About four feet seven inches long.

V. barbatus and *barbarus*, Lath. and Gmel. ; *V. aureus*, Briss. ; Vautour doré, Buff. ; Bearded and Golden Vulture, Lath. ; the Nisser, Bruce. The young, *V. niger*, Lath. ; *G. melanocephalus*, Meyer.

This species is a native of many of the wilder regions of Asia and Africa, and exists also, though more sparingly, in Europe, as in the Swiss Alps and Pyrenees, and in the mountains of Tyrol and Hungary. The German appellation of *Lamm-Geier*, or *Lamb Vulture*, has been applied to it, as to other large birds of prey.

Gen. 4. GYPOGERANUS, Illig.—*Vultur*, Lath.

Bill shorter than the head ; thick, strong, hooked, bent from its origin, furnished with a cere at its base, a little arched, compressed at the point ; nostrils a little separated at the base, lateral, pierced in the cere, diagonal, oblong, open ; legs very long, slender ; tibia feathered, tarsus long, slenderer at its base than at its upper part ; toes short, warty below, the anterior united at the base ; thumb articulated on the tarsus ; wings long, the first five wing-feathers longest and almost equal ; wings armed with a blunt spur.

G. serpentarius, Tem. (*Vultur serpentarius*, Lin.) The Secretary. Colour cinereous ; tail wedge-shaped, with the middle tail-feathers lengthened, and a crest of feathers on the occiput capable of erection. Inhabits Cape of Good Hope.—*Shaw*, vii. pl. 14.

This species inhabits the dry plains in the lower parts of Africa and the Philippine Islands. Being almost always obliged to run in pursuit of its prey, it seldom avails itself of its power of flight ; and it frequently kills, or at least wholly disables, a snake, by breaking the vertebræ with a single stroke of the wing. In its natural state it is very wild, and not easily approached, but when taken young, the snake-eater may be easily tamed, and kept with poultry in the farm-yard, where it is serviceable in destroying rats and other noxious animals. It may be fed with meat, either raw or dressed, and will readily eat fish ; but if allowed to fast too long, it is apt to seize on small chickens and ducklings, which it swallows whole.

Gen. 5. FALCO, Lin.

Head covered with feathers ; bill hooked, generally bent from its origin ; a coloured cere, more or less hairy at its base ; mandibles sometimes notched ; nostrils lateral, rounded or oval, pierced in the cere, open ; legs with tarsi covered with feathers or scales ; three toes before, one behind, the exterior generally united at its base to the middle toe ; claws sharp, much hooked, retractile.

The Falcons are noble birds of prey. Their appearance and their motions indicate their manner of living to be very different from the preceding genera. Strength and cunning form the attributes of this family. They are provided with more powerful offensive arms, and their power of wing, of sight, and prehension are also very different. The size of their head is in proportion to their body, and both it and the neck, which is thick and short, are covered with feathers. They live in couples, and are not gregarious. Their food consists of living prey, which they seize and carry in their talons. They rise in the air to a prodigious height, their flight is rapid and sustained, and their sight is very acute. The larger species feed on the smaller

mammiferous animals and birds, others on fishes, and some attack reptiles. The greater number of the smaller species are insectivorous, and prey chiefly on beetles. Their plumage at different ages is very various. The young are many years old before coming to their full and constant plumage, this not taking place till the third, fourth, and in some species till their sixth year. The young are always distinguished from old individuals by numerous and varied lines and spots, while the colour of the adult birds is generally in large masses; and when the colours and plumage of the old birds are disposed in transverse lines or spots, the young of the same species have these bands and spots longitudinal. The males are always about a third smaller than the females.

1.—FALCONS.

Bill short, bent from its base; upper mandible with one and rarely two strong teeth, which lock into hollows in the lower mandible; legs robust; toes strong, long, armed with crooked and sharp claws; tarsi short; wings long, the first wing-feather and the third of equal length, the second longest.

The falcons prey habitually on living animals, and show much address in seizing and surprising their prey. They nestle in the crevices of rocks. The greater number of the species of this division may be employed with success in hawking. The name *noble birds of prey*, which has been applied to them, comes probably from the prerogative formerly attached to falconry, of which the practice was only permitted to nobles. The species of this division are difficult to be distinguished from one another, the young of the first year and the smaller species resembling one another so much in colour and plumage. The comparative length of the wings and tail, and the colour of the feet, cere, and eyelids, are the surest means of ascertaining the specific differences.

F. Islandicus, Lath. The Jerfalcon. Ground of the plumage white, with narrow brown bands on the upper parts, and on the tail; under parts marked by little brown spots in the form of tears, most numerous and largest on the flanks; bill yellowish; cere and round the eyes of a livid yellow; iris brown; feet of a fine yellow. Male about one foot nine inches long; the female two or three inches more. Inhabits Iceland, Denmark, and North of Germany, nestling in inaccessible rocks.—*Selby, Illust. pl. 14.*

F. rusticolus, Gmel.; Gerfaut de Norwege, Buff.; White Jerfalcon, Lath.; Col-lared Falcon, Penn.—The young, **F. Gyrfalco** and **sacer**, Gmel.; **Buteo cinereus**, Daud.; Le Gerfaut, Le Sacre, Buff.; Brown Jerfalcon, Lath.

Next to the eagle, the Jerfalcon is reputed the most formidable and active, as well as the most prompt and intrepid of all our predaceous birds; and it is still the most esteemed for falconry. The female boldly attacks the largest of the feathered race, the stork, heron, and crane being its easy victims.

F. Lanarius, Lin. The Lanner. Wings ending two-thirds from the end of the tail; middle toe shorter than the tarsus; a very narrow mustache, which disappears with age; feet bluish; the two first wing-feathers with truncated beards towards the end. Inhabits Europe.—*Tem. 20.*

F. peregrinus, Lin. The Peregrine Falcon. Wings extending to the extremity of the tail; middle toe as long as the tarsus; a very large black mustache, which spreads with age; feet yellow; a single wing-feather with truncated web towards the end. Fourteen inches long.—*Selby, Illust. pl. 15, 15.**

Le Lanier, and Faucon, Buff.; **F. abietinus**, Bechst.; Blue Black Falcon, Penn.; Sparviere pellegrino, Storr.—The young, **F. hornotinus**, Briss.; Le fauconsors, Buff.; Yearling Falcon, Lath.

Inhabits the mountainous countries of Europe, and preys on grouse, pheasants, and partridges. Various instances are recorded of the rapidity of its flight. Thus, one that eloped from its master, in the county of Forfar, on the 24th of September 1772, with four heavy bells at its feet, was killed on the morning of the 26th of the same month at Mostyn, in Flintshire. Another, belonging to a Duke of Cleves, flew out of Westphalia into Prussia in one day; and in the county of Norfolk one was known to make a flight at a woodcock at the rate of nearly thirty miles in an hour. The female peregrine falcon is, in the terms of falconry, always called *Falcon*, while the male is denominated *Tercel*; and, when thoroughly bred, they are called *Gentil* or *Gentle Hawks*.

F. subbuteo, Lath. The Hobby. Throat white, with a large black band extending on the white parts of the sides of the neck; upper part of the body bluish black; lower parts whitish, with longitudinal black spots; bill bluish; cere, eyelids, and feet yellow; iris brown; wings extending beyond the extremity of the tail. About 14 inches long.—*Selby, Illust. pl. 16.*

This is a migratory species, arriving in England in April for the purpose of incubation, and leaving the country in October for warmer latitudes. Its favourite prey is the lark. When falconry was in fashion the hobby was trained to the pursuit of young partridges, snipes, and larks.

F. aesalon, Tem. (*F. casius* Meyer.) The Merlin or Stone Falcon. Cere and legs yellow; head ferruginous, body bluish-gray, with ferruginous spots and streaks above; yellowish-red, with oblong spots below; wings ending at two-thirds of the length of the tail. About 12 inches long.—*Selby, Illust. pl. 18.*

F. casius, Meyer; *F. lithofalco*, Gmel.; Le Rochier, Buff.—The young, *L'é-mérillon*, Buff.; Sparviere smeriglio, Stor.

The Merlin is a migratory species, resorting to the north in spring, and returning to the south on the approach of winter. According to Mr Pennant it does not breed in England; but in Northumberland Colonel Montagu found three young ones about half-grown in the middle of a high clump of heath, in which they were so well concealed that they would not have been discovered but for a setting dog, which made a point at them.

F. tinnunculus, Lin. The Kestrel. Wings ending at three-fourths of the length of the tail; upper part of the plumage of the male variegated with numerous black spots; wing-feathers banded interiorly; claws constantly black. Fourteen inches long. Inhabits Europe. B.—*Selby, Illust. pl. 17.*

The young, *F. bruneus*, Bechst.; *F. fasciatus*, Retz.

The Kestrel is by far the most elegant of the small British hawks. The eggs, which are four or five in number, are rather inferior in size to those of the sparrowhawk, and of a dirty white, blotched with rust-colour of various shades, and sometimes wholly covered with a deep rusty red. It is a common inhabitant of our rocky coasts, or in high or ruinous towers. Its prey is moles, field-mice, frogs, and small birds, on which it darts like an arrow. When taken young it is easily tamed.

F. tinnunculoides, Natterer. Wings ending at the extremity of the tail; upper part of the plumage and quill-feathers of the male without spots; claws pure white. Inhabits Europe.—*Tem. 31.*

F. rufipes, Bechst. Principal colours of a more or less deep bluish; cere and feet red; claws yellow. Common in Russia and Poland.—*Lath. Ind. 46.*

F. vespertinus, Gmel.; Le Kober, Son.; Ingrian Falcon, Lath.

F. punctatus, Cuv. Plumage rufous above, with the head and neck longitudinally striped with black ; back and wings spotted with black ; seven black bands on the tail ; body beneath white, spotted with black ; cere and legs yellowish ; bill bluish. Ten inches long. Inhabits Isle of France.—*Tem. Pl. Col.* 45.

F. femoralis, Tem. Plumage above ashy brown, red beneath, with a black band above and behind the eye ; thighs red ; bill blue ; cere yellow. About a foot long. Brazil.—*Tem. Pl. Col.* 121.

F. severus, Horsfield. Plumage dusky brown above, with the quills black ; chestnut coloured-beneath, with the throat pale. Ten inches and a half long. Inhabits Java.—*Lin. Trans.* xiii. 135.

2.—EAGLES.

Bill strong, of considerable length, and hooked towards the extremity ; legs strong, nervous, covered with feathers, or naked ; toes robust, and armed with powerful and very crooked claws ; wings long, the first, second, and third feathers shorter than the fourth and fifth.

F. imperialis, Tem. The Imperial Eagle. Crown of the head and occiput furnished with acuminate reddish feathers, edged with bright red ; upper part of the body of a very dark glossy brown above, of a very dusky brown beneath, with the exception of the abdomen, which is yellowish red ; some of the scapulars always pure white ; wings the length of the tail, which is almost square ; last joint of the middle toe with five scales.—*Shaw, vii. pl.* 15.

The Imperial Eagle is diffused over Hungary, Dalmatia, and Turkey, and is more common in the eastern and southern parts of the world than in any other quarter, abounding in Egypt and on the coast of Barbary ; but it is rare in the centre of Europe. It inhabits the extensive forests of hilly countries, preying on stags, roebucks, foxes, and other mammiferous animals, and often on large birds. The female breeds in lofty trees or elevated rocks, and lays three or four eggs of a dirty white.

F. fulvus, Tem. (*F. chrysaëtos*, Lin.) Ring-tail or Golden Eagle. Crown of the head and neck with acuminate feathers of a bright rufous and golden tinge ; all the other parts of the body of an obscure brown, more or less blackish, according to age ; scapulars never white ; three scales upon the last joint of all the toes. Male about three feet long ; the female three feet and a-half ; spread of the wings between seven and eight feet.—*Selby, Illust.* pl. 1. and 2.

Aquila fulva, Meyer ; *F. fulvus* and *F. Canadensis*, Gmel. ; *F. chrysaëtos*, Lin. ; l'Aigle Royal, Buff. ; l'Aigle Commun, Cuv. ; Ring-tail and Golden Eagle, Lath.—Var. *F. albus*, Gmel. ; *F. cygneus*, Lath. ; l'Aigle Blanc, Briss.

The Golden Eagle inhabits the high mountain ranges of the north of Europe. It is frequently found in Scotland, and preys on fawns, lambs, hares, and large birds. It nestles on precipitous cliffs, and the female lays two eggs, rarely three, of a dirty white, spotted with reddish. It soars to a prodigious height, and from this elevation can discover its prey at an immense distance. It is extremely tenacious of life, whence probably originated the eastern notion, that eagles possessed the power of renewing their youth. Keyser alludes to an individual which lived a hundred and four years at Vienna, though in a state of confinement. Nor is it less remarkable for enduring abstinence, especially when deprived of exercise ;

for one taken from a fox-trap refused food for five weeks, when it was killed. Redi likewise informs us that he kept two alive, the one for twenty-eight, and the other for twenty-one days without food. In old age individuals of this species are said to become more or less hoary or white. Numerous stories are related of the strength of this bird, and of its carrying off children as its prey; but few of these are well authenticated. Ray, however, mentions, that in one of the Orkneys an infant of a year old was seized in the talons of an eagle, and conveyed about four miles to its eyrie; while the mother, knowing the spot, pursued the bird, found her child in the nest, and took it home unhurt.

F. naevius, Lin., including his *maculatus*. (*Aquila planga*, Vieill.)

The Spotted Eagle. Body, head, wings, and tail, of a glossy brown, of various degrees of intensity, according to age; bill black; cere and toes yellow. Nearly two feet long. Inhabits woods and mountains in Europe, Africa, and Asia.—*Shaw*, vii. 84.

The young is *F. maculatus*, Gmel.; Rough-footed and Spotted Eagle, Lath.; L'Aigle tacheté, Cuv.

F. armiger, Shaw. Plumage gray brown above, white below; occiput crested; smaller wing-feathers and tail crossed with whitish bands; bill bluish with a black tip; claws black, very strong and crooked. Size of the golden eagle. Inhabits Africa.—*Shaw*, vii. 57.

F. pennatus, Lin. Feet feathered to the toes; a tuft of white feathers at the insertion of the wings; tail brown above. Length 18 inches. Inhabits eastern parts of Europe.—*Tem*. 44.

F. Malayensis, Tem. Plumage sooty brown, more or less dusky according to the age; irregular whitish bands at the base of the wing-feathers, and whitish lunules on the tail-feathers. Inhabits the Indian Archipelago.—*Tem. Pl. Col.* 117.

F. fucosus, Cuv. Plumage dusky brown, varied with yellowish red, throat and fore-part of the neck dusky brown; head and neck beautiful golden red; tail yellowish beneath, with indistinct bands; bill and legs yellow.—*Tem. Pl. Col.* 32.

F. brachydactylus, Wolf. Head very thick; a space above the eyes covered with white down; top of the head, cheeks, throat, breast, and belly white, but variegated with numerous spots of clear brown; coverts of the wings brown, with the origin of the feathers white; tail square, grayish brown, with bands of a deeper colour; bill black; cere bluish; iris yellow. Two feet long. Inhabits pine forests in the north of Europe, and feeds chiefly on lizards and snakes.—*Shaw*, vii. pl. 19.

Aquila brachydactyla, Meyer; *F. Gallicus*, Gmel.; *F. leucopsis*, Bechst.; *Le Jean le blanc*, Buff.; *F. terzo d'aquila*, Stor.

F. albescens, Daud. Whitish, variegated above with yellowish brown; tail black, barred with white; back of the head slightly crested. About a third smaller than the golden eagle, and of a more slender shape. Cape of Good Hope.—*Shaw*, vii. 93.

F. haliaetus, Lin. The Osprey Eagle. General colour brown above, white beneath, with whitish head, and blue cere and legs; iris yellow; bill black; wings extending beyond the extremity of the tail. About 21 inches long.—*Selby, Illust.* pl. 4.

F. arundiacus, Gmel. ; Le balbuzard, Buff. ; Osprey Eagle, Lath. ; Flus adler, Bechst.

This species makes its nest in the crevices of rocks, or on the tops of tall trees, and occasionally on the ground among reeds, laying from two to four white eggs, spotted with reddish, rather smaller than those of the domestic hen. It inhabits the banks of large rivers and lakes, and feeds principally on fish. It is found in most of the countries of Europe.

F. albicilla, Lath. Lin. (*F. ossifragus*, Gmel.) Sea Eagle or Osprey. Plumage of a clear brown, spotted with deeper colour ; bill and iris almost black in youth ; colour uniform ash-coloured, or brown in the adult ; tail not reaching beyond the wings. Two feet four inches long. Inhabits the coasts of England, Holland, and France.—*Selby, Illust. pl. 3, and 3.**

F. albicaudus, Gmel. ; Le grand Pygargue, Buff. ; Fisch-adler, Bechst. ; Cinereous Eagle, Lath.—The young, *F. ossifragus, melanaetos*, Gmel. ; L'orfraie, Buff. ; Sea Eagle, Lath. ; Golden Eagle, Penn.

The Greenlanders, who kill these birds with arrows, or catch them by snares laid on the snow, eat their flesh, make under garments or beds of their skins sewed together, and use the bill and claws as amulets in the treatment of various complaints. This species possesses astonishing capability of enduring the cravings of hunger ; and Mr Selby mentions an instance where the bird was permitted, through the inattention of its keeper, to be without food for several weeks.

F. leucocephalus, Lin. White Headed Eagle. Plumage very irregularly spotted and variegated with light and deep brown ; bill black ; iris clear brown ; in the young chocolate brown ; bill, feet, and iris yellowish white in the adults ; tail always extending beyond the wings. Inhabits Arctic regions.—*Wilson, Ornith. iv. pl. 36.*

L'Aigle à tête blanche, Cuv. ; L'Aigle Pygargue, Vieill. ; Bald Eagle, Lath.

F. vocifer, Shaw. Brown ferruginous, undulated with black ; head, neck, breast, and tail, white. Size of the Osprey. Inhabits Southern Africa.—*Shaw, vii. 94.*

F. maculosus, (*Aquila maculosa*, Vieill.) Head, neck, and back black ; chin, throat, and breast white, each feather streaked with black ; abdomen black, with round spots of white ; vent and thighs rust-coloured ; bill and cere blue ; iris yellow ; legs orange. Two feet long. Inhabits Guiana.—*Vieill. Ois. de l'Amer. Sept.*

F. Linnæus, Horsf. Plumage of a reddish brown, slightly tinged with purple ; tail beneath, except the tip, whitish ; cere yellow ; bill black ; feet bluish. Two feet long. Inhabits Java.—*Lin. Trans. xiii. p. 138.*

F. niveus, Tem. Plumage above fuscous, white beneath ; base of the quill-feathers white ; tail-feathers, with the exception of the two middle ones, whitish on the edges of their inner web, and bright brown on the other parts, and transversely banded with deeper brown ; legs yellow. Two feet long. Java.—*Tem. Pl. Col. 127.*

3.—HAWKS.

Wings short, ending at two-thirds of the length of the tail ; first wing-feather shorter than the second, the third nearly equal to the fourth ; feet with long tarsi ; toes long, the intermediate the longest ; claws much bent and very sharp.

F. palumbarius, Lin. The Goshawk. Upper parts bluish-cinereous ; a broad white stripe above the eyes ; the under parts white, with transverse bands, and longitudinal lines of dark brown ; tail cinereous, with four or five blackish brown bars ; bill bluish black ; cere yellowish green ; iris and feet yellow. Length of the female about two feet ; size of the male about one-third less. Inhabits Europe, &c.—*Selby, Illust.* pl. 12.

L'Autour, Buff. ; Goshawk, Lath. ; Hunerhabicht, Bechst. ; Sparvière da Colombi, Stor.—The young, *F. gallinarius* and *gentilis*, Gmel. ; L'Autour sors, Buff. ; Greater Buzzard, Lath.

This species breeds on the tops of high trees, the female laying two to four eggs of a bluish white, spotted with fulvous. It flies low, proves very destructive to game, pigeons, and poultry, and dashes through the woods with great impetuosity after its quarry ; but if it cannot almost immediately catch the object of its pursuit, it desists, and perches on a bough, till some other opportunity occurs. In the days of falconry, it was held in higher estimation than any of the short-winged hawks, and was used for the larger sorts of game. According to Mr Low it is common in the Orkney Islands.

F. nisus, Lin. The Sparrowhawk. Bluish-cinereous above ; a white spot on the neck ; white beneath, with brown undulations ; tail ash-gray, with five bars of blackish-cinereous ; cere yellowish green ; feet and iris yellow. About 12 inches long. Inhabits Europe.—*Selby, Illust.* pl. 13.

L'Epervier, Buff. ; Die Sperber, Bechst ; *Accipiter fringillarius*, Ray.

This species is well known for its depredations upon pigeons and small birds. In a nest containing five young ones, Mr Selby found a lapwing, two blackbirds, a thrush, and two green linnets, recently killed, and partly divested of their feathers. It likewise preys on mice, moles, lizards, and snails. It builds in lofty trees, old ruins, or high rocks, frequently occupying the old nest of a crow, and lays from four to six eggs, of a dirty white, and sometimes of a bluish tinge, blotched at the large, and sometimes, though rarely, at the narrow end, with reddish colour. It is easily tamed ; though when the young are reared together, the female birds, being largest and strongest, will destroy and devour the males.

F. cachinnans, Lin. (*Niacagua* of Azara.) The Laughing Falcon. Cere and legs yellow ; eyelids white ; body variegated with brown and whitish ; top of the head black, surrounded by a white ring. Inhabits Paraguay.—*Vieill. Gal. des Ois.* pl. 19.

F. minullus, Shaw. Dwarf Sparrowhawk. Brown above, white beneath ; breast marked with descending brown streaks, and the abdomen with descending brown bars. Size of the blackbird. Inhabits Southern Africa.—*Shaw*, vii. 205.

F. musicus, Daud. Gray above, with brown undulations beneath, black wing-feathers, and brown wedge-shaped tail, barred with white. Inhabits Africa.—*Shaw*, vii. 143.

In the breeding season the note of the male is much more musical than that of any bird of prey, and is heard at the dawn of day, or in the dusk of the evening, and not unfrequently during the greater part of the night.

F. hemidactylus, Tem. Plumage lead-coloured above, paler beneath ; quills black, with a broad white band ; tail with two broad black bands and two clear reddish ones. Fifteen inches long. Inhabits Brazil.—*Tem. Pl. Col.* 3.

F. gracilis, Tem. Plumage cinereous lead-coloured above, whitish below, striped with ash-coloured bands ; tail with very slight

indications of transverse stripes. Eighteen inches long. Inhabits Brazil.—*Tem. Pl. Col.* 91.

F. nitidus, Tem. Plumage lead-coloured above, white below, transversely waved with ash-colour; tail black, with two narrow white bands; legs long and yellow. Thirteen inches long. Inhabits Guiana.—*Tem. Pl. Col.* 87.

F. xanthothorax, Tem. Plumage reddish brown above, white beneath; transversely striped with rufous; head, throat, and neck cinnamon red. Twelve inches long. Brazil.—*Tem. Pl. Col.* 92.

F. brachypterus, Tem. Plumage dusky brown above, collar and abdomen white, transversely striped with black; tail wedge-shaped with three white bands. Eighteen inches long. Inhabits Brazil.—*Tem. Pl. Col.* 116, 141.

F. poliogaster, Natterer. Plumage slaty black, beneath ashy white; throat white; tail black, with three gray bands above and four below; male reddish, with the wings and back dusky. Sixteen inches long. Inhabits Brazil.—*Tem. Pl. Col.* 164, 295.

4.—KITES.

Nostrils oblique, with a fold at their exterior margin; tarsi short, feathered a little below the knee; wings very long, the third and fourth feathers longest; tail forked.

F. milvus, Lin. The Kite or Glead. Upper parts of the body of a reddish brown, the feathers bordered with a brighter colour; lower parts ferruginous, with longitudinal dusky spots; feathers of the neck and head long and slender, whitish, striped longitudinally with brown; tail bright ferruginous, forked; bill hooked at the end; cere, iris, and legs yellow. Two feet two inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 5.

Le Milan Royal, Buff.; Rother Milan, Bechst. The young, *F. Austriacus*, Gmel. and Lath.

The Kite is known by its flight, which resembles a sailing or gliding through the air, without apparent motion of its wings. It preys on young rabbits, hares, game of all kinds, poultry, and young birds incapable of flight. It will also destroy young lambs, and feed greedily on carrion; but, in default of these, it readily eats mice, worms, insects, and even snakes. It frequently resorts to the neighbourhood of towns to pick up offals, which it also sweeps from the surface of the water with great dexterity.

F. ater, Lin. Head and throat banded longitudinally with brown and whitish; upper parts of a deep grayish brown, lower parts reddish brown, with longitudinal spots on the middle of the feathers; thighs deep red; quill-feathers deep brown; tail very little forked, with ten bands of a brighter colour; bill black. Length one foot ten inches. Inhabits Germany, &c.—*Lath. Syn.* i. 62.

F. furcatus, Lin. Swallow-tailed Kite. White; with the back, wings, and very long forked tail, purplish black. About two feet long. Inhabits Carolina, Louisiana, &c.—*Shaw*, vii. 107.

F. melanopterus, Shaw. Plumage gray above, white beneath; wing-coverts black; tail subrufous, forked; bill black; iris and legs yellowish. Size of the Kestrel. Inhabits Africa.—*Leach, Zool. Mis.* iii. pl. 122.

F. Riocourii, Vieill. Plumage ashy blue above, the under parts, forehead, cheeks, and tip of secondary feathers white; lower wing-coverts deep black; tail forked. Thirteen inches long. Inhabits Senegal.—*Tem. Pl. Col.* 85.

5.—BUZZARDS.

Bill small, bending immediately from the base; wings shorter than the tail, and the first four feathers notched near their tip; first quill-feathers very short, the fourth the longest; thigh-feathers long and pendant; tarsi short, and claws not much hooked.

F. buteo, Lin. Common Buzzard. Plumage brown and ferruginous above, white and ferruginous beneath; cere, iris, and legs yellow; tail banded with brown. About 21 inches long. Inhabits Europe.—*Selby, Illust. pl.* 6.

The Buzzard preys on small birds, young rabbits, and hares, moles, field-mice, lizards, frogs, toads, and likewise on worms and insects. The female makes her nest in the fork of a tree, with large sticks, and lines it with wool, hair, or other soft substance, and sometimes takes possession of a deserted crow's nest, which it enlarges, and accommodates to its purpose. It is a sluggish and inactive bird, and will sit for the greater part of a day on the same bough.

F. lagopus, Lin. Rough-legged Buzzard. Feet feathered to the toes, a large brown patch on the belly, and a considerable portion of the tail white from its origin. About two feet long. Inhabits Europe and N. America. B.—*Selby, Illust. pl.* 7.

This species feeds on partridges and small birds, nestles in large trees, and lays four or five eggs, marked with reddish undulations. It has sometimes been shot in England.

F. apivorus, Lin. The Honey Buzzard. Plumage brown above, with cinereous bands on the wings; under parts white, with triangular brown spots; space between the eye and the bill covered with close set feathers in the form of scales. About two feet long. Inhabits Europe. B.—*Selby, Illust. pl.* 8.

This species feeds on small birds, mice, reptiles, and insects, particularly bees. It builds in trees, forming its nest of small twigs, lined with wool, and laying, for the most part, two eggs.

F. pterocles, Tem. Plumage slate-coloured above, beneath white, with the flanks and sides transversely waved with rufous; tail white, with a black band towards the tip. Sixteen inches long. Inhabits Brazil.—*Tem. Pl. Col.* 56, 139.

F. pacilonotus, Cuv. Plumage white; wings black, spotted with crescent-shaped spots of white; tail with a black band, its base and tip white; bill black; legs yellowish. Inhabits Guiana.—*Tem. Pl. Col.* 9.

6.—HARRIERS.

Bill bending from its base; nostrils oviform; tail long and rounded; wings long, the first quill-feather very short, the third and fourth longest; tarsi long and slender.

F. rufus, Lin. Marsh Harrier. Plumage brown; head and breast white yellowish; bill black; cere and legs yellow. About twenty inches in length. Inhabits Europe. B.—*Selby, Illust. pl.* 9.

The Marsh Harrier is but sparingly dispersed over most of the countries of Europe; but Montagu remarks, that it is the most common of the falcon tribe about the sandy

flats of the coast of Caermarthen, where he saw no fewer than nine of them regaling on the carcass of a sheep. It abounds in marshy districts both in England and Scotland.

F. cyaneus, Lin. The Hen-harrier. Head and upper part of the body bluish gray; wing-feathers white at their origin, the rest black; under part pure white; iris and legs yellow; wings ending at three-fourths the length of the tail; the third and fourth wing-feathers of equal length. Eighteen inches long. Europe. B.—*Selby, Illust. pl. 10.*

This species flies low, skimming along the surface in quest of prey; delights in marshy situations, and feeds on lizards, and other small reptiles and birds. It has its English appellation from its persecutions in the poultry-yard.

F. cinerarius, Mont. Wings terminating at the end of the tail; the third wing-feather the longest; body above blackish ash-coloured; two black transverse bands on the secondary feathers of the wings; belly, thighs, and flanks white, but striped longitudinally with red; iris and feet yellow. Seventeen inches long. Inhabits Hungary and Poland; rare in England.—*Selby, Illust. pl. 11.*

F. palustris, Tem. Plumage pale brown above, beneath pale yellowish red, with longitudinal brown stripes; throat deep brown; quill-feathers and tail ashy-gray striped with brown; eyebrows white. Twenty inches long. Inhabits Brazil.—*Tem. Pl. Col. 22.*

F. rutilans, Lichten. Plumage bright golden red, varied on the head with small longitudinal striæ; back and wings spotted with ashy brown; body beneath transversely lined with dusky stripes. Eighteen inches long. Inhabits S. America.—*Tem. Pl. Col. 25.*

7. CARACARÆ, Cuv.—*Cheeks and throat naked.*

F. Braziliensis, Shaw. (*V. Cherinway*, Lath.) Cere rose-coloured; feet yellow; body ferruginous; head white; vertex crested with ferruginous; bill bluish; head and neck yellowish; tail-feathers blackish, with two intermediate white bands. Two feet and a-half long. Inhabits S. America.—*Lath. Ind. 8.*

F. formosus, Lath. (*Ibycter aquilinus*, Vieill.) Cere, orbits, and feet yellowish; throat purple; upper part of the body blackish red; abdomen flesh-coloured. Eighteen inches long. Inhabits S. America.—*Shaw, Nat. Mis. pl. 485.*

F. aterrimus, Tem. (*Daptrius ater*, Vieill.) Plumage bluish black, shining; tail rounded, white at its base; bill and claws white; legs yellow; cere blackish. 15 inches long. Brazil.—*Tem. Pl. Col. 37.*

8. CYMINDI, Cuv.—*Tarsi short; toes half webbed.*

F. hamatus, Illig. Plumage lead-coloured or brown, spotted with red; quill-feathers black; base of the tail and under coverts whitish; cere and legs reddish orange. Sixteen inches long. Inhabits Brazil.—*Tem. Pl. Col. 61, 231.*

F. uncinnatus, Illig. Plumage lead-coloured above, paler below; quills banded with brown ash; base of the tail white, its tip griseous; bill hooked. 15 inches long. Brazil.—*Tem. Pl. Col. 103, 104.*

F. Cayanaensis, Lath. Legs bluish; body blackish ash-coloured, white below; head and neck bluish white; tail banded with black and white; iris yellow; primaries black. Size of the peregrine falcon. Inhabits Cayenne.—*Lath. Ind.* 28.

Gen. 6. STRIX, Lin.

Bill compressed, bent from its origin; base surrounded by a cere, covered wholly or in part by stiff hairs. Head large, much feathered; nostrils lateral, pierced in the anterior margin of the cere, rounded, open, concealed by hairs directed forwards; eyes very large, orbits surrounded by feathers; legs feathered, often to the claws; three toes before and one behind, separate, the exterior reversible; the first wing-feathers dentated on their exterior border, the third the longest.

The greater number of the species of this genus are nocturnal birds of prey, although some of them are capable of seeking their food by day. All have soft and downy feathers, which enable them to fly without noise. They seize their prey with their claws, and do not feed on dead animals but when pressed by hunger. The hair, the feathers, and the bones of the animals they feed upon are rejected after digestion in little balls. They moult once a year. Temminck names those which seek their prey by day Accipitrine owls, and distinguishes them by their large tail extending beyond the termination of the wings; and the nocturnal species by their tail being shorter and more rounded. But these divisions are not well marked, and it has therefore been thought better to arrange them by their having or wanting the auricular feathers. Although none of the nocturnal birds of prey are materially hurtful to mankind, and although they are instrumental in the destruction of vermin, yet in almost every age and country they have been regarded by the vulgar as creatures of evil omen, and the heralds of death.

† *Horned Owls.*

S. bubo, Lin. Great-horned Owl. Body variegated and waved with black and ochre colour; inferior parts of this last colour with longitudinal black spots; throat white; two tufts of feathers on the forehead; legs covered to the toes with feathers of a reddish yellow; bill and claws horn-coloured; iris bright orange. Two feet long. Inhabits Europe. B.—*Shaw*, vii. pl. 28.

This species seldom perches on trees; but haunts mountainous, rocky, and desolate situations, as deserted towers, precipices, and lonely crags, and feeds on partridges, leverets, young rabbits, moles, mice, serpents, lizards, toads, frogs, and even bats. A variety of the present species was venerated by the Athenians as the sacred bird of Minerva, and the emblem of wisdom.

S. otus, Lin. Long-eared Owl. Plumage yellow ferruginous, with black and gray variegations; horns consisting of ten feathers, bordered with whitish yellow; lower parts of an ochre yellow, with oblong blackish brown spots; bill black; iris reddish. One foot 13 inches long. Inhabits both continents.—*Selby, Illust.* pl. 20.

S. scops, Lin. Scops Eared Owl. Plumage gray brown, with blackish variegations above, and gray, speckled with black and reddish brown, beneath; horns formed of little feathers united in a tuft; transverse bands, crossed by longitudinal ones on the centre of the feathers; bill black; iris yellow. Seven inches long. Europe.—*Selby, Illust.* pl. 22.

- S. brachyotos*, Lath. Short-eared Owl. Head small, with two or three short feathers on the forehead, forming a kind of horns ; around the eyes blackish ; plumage above ferruginous, bordered with ochre yellow ; tail of the same colour, with transverse brown bands ; bill black ; iris yellow ; legs and toes feathered. Twelve inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 21.
- S. atricapilla*, Natterer. (*Scops*, Savigny.) Crown of the head black, with the body above, wings, and tail yellowish, varied with black and brown ; white below, longitudinally spotted and striped with brown ; feathers at the ears white, pencilled with black ; a reddish collar on the nape of the neck. Ten inches long. Inhabits Brazil.—*Shaw*, xiii. pl. 39.
- S. noctula*, Reinwardt. Plumage black or brownish, marbled with reddish ; beneath reddish white, transversely waved and spotted ; a double collar on the neck, white above, with brown spots, black below, with reddish white spots. Eight inches long. Inhabits Java.—*Tem. Pl. Col.* 99.
- S. Ceylonensis*, Lath. (*S. Ketupa*, Horsf.) Auricular feathers short and pointed ; body brownish black above, paler below ; feathers round the face brown, banded with black ; wing and tail-feathers with transverse lines of black and white ; legs almost naked ; claws and bill of a dark colour. Ceylon.—*Tem. Pl. Col.* 74.
- S. lactea*, Tem. Plumage white above, variegated with brown and striped with griseous and white ; beneath waved with brown ; tail and quill-feathers banded with yellow ; tarsi white ; toes blue. Two feet long. Inhabits Senegal.—*Tem. Pl. Col.* 4.
- S. ascalaphus*, Savigny. (*Otus ascalaphus*, Cuv.) Plumage rusty red, spotted with brown ; wings and back vermiculated and the belly transversely lineated with brown ; ear-feathers short. Eighteen inches long. Inhabits Africa.—*Tem. Pl. Col.* 57.

†† *Smooth-headed Owls.*

- S. Lapponica*, Retz. Head very large ; face broad, covered with long feathers of a pure gray with brown bands, a broad circle of blackish feathers surrounding the face ; upper part of the body and wings of a fine gray, marked with numerous zigzag spots of dirty brown ; tail almost equal, much longer than the wings ; tail and wing feathers banded with brown ; feet feathered to the toes. About two feet long. Inhabits Lapland.—*Tem.* 82.
- S. nyctea*, Lin The Snowy Owl. Plumage snow-white, spotted with transverse brown bands ; head small ; bill black ; irides yellow. About two feet long. Inhabits Northern Europe and America. B.—*Selby, Illust.* pl. 23.

This species is not uncommon in Shetland ; and a male and female were taken in Northumberland in January 1823, during a severe snow storm. It preys on grouse, hares, rabbits, carrion, &c. nestles in craggy rocks or old pines, and lays two white round eggs, which, according to Vieillot, are spotted with black. Its cry has been compared to that of a man in deep distress. Among the Kalmauc Tartars it is deemed a crime to kill them, because they are considered to be the oracles of good or bad fortune, according as they fly to the right or to the left.

- S. Uralensis*, Pallas. (*Surnia*, Dumeril.) Head very large, much feathered, of a grayish white, with some black hairs; a broad circle of white feathers spotted with black surrounding the face; top of the head, neck, back, and coverts of the wings with large longitudinal spots; wings and tail banded with brown and white; bill yellow, entirely concealed in the long hairs of the face; claws long, yellowish; tail much longer than the wings. Ten inches long. Inhabits Northern Europe.—*Shaw*, vii. pl. 35.
- S. funerea*, Lath. Forehead dotted with white and brown; a black band behind the eyes and surrounding the orifice of the ears; upper parts of the body with brown and white spots of various forms; lower parts white, banded transversely with brown ash-colour; iris and bill yellow; feet feathered to the nails. Fourteen inches long. Inhabits the Arctic regions.—*Tem. Man.* 86.
- S. nebulosa*, Lin. (*Ulua*, Cuv.) Barred Owl. Transversely fasciated with brown and whitish above, with oblong ferruginous spots beneath; extremity of the toes covered with scales; bill yellow; iris brown. Length 20 inches. Arctic regions.—*Shaw*, vii. 245.
- S. stridula*, Gmel. (*S. aluco*, Meyer.) Common Brown Owl. Ferruginous, or gray brown; wing-coverts spotted with white; feathers of the wings and tail banded transversely with blackish and reddish ash-colour; iris glaucous; feet feathered to the toes. About 15 inches long.—*Selby, Illust.* pl. 25.

This species is a native of most of the countries of Europe, and is also found in Newfoundland and South America, frequenting large and dense forests, and concealing itself in the thickest recesses. It breeds in the hollows of trees, and sometimes in barns and granaries, in which it is welcomed by the farmer, on account of the numbers of mice which it destroys; but it is a far less acceptable visitor in pigeon houses, in which it commits serious devastations. It lays from two to four eggs, of a dull white, and of a roundish shape. The young are covered with a light-coloured down, and soon become tame, if fed from the hand. If put out of doors within hearing of the parent birds the mother visits them at night, and supplies them with ample provision. This is one of the most common of the British owls, and the only one of them which hoots, inflating its throat, at the same time to the size of a hen's egg.

- S. flammea*, Lin. Common Barn Owl. Sub-fulvous, variegated with gray and brown; black and white spots down the shafts of the feathers; breast and abdomen white; feet and toes covered with a short down; iris yellow. 13 inches long.—*Selby, Illust.* pl. 24.

This species is very widely diffused, and is found in most parts of the world. It usually haunts old churches, towers, barns, farm-houses, &c. and preys on rats, mice, bats, and beetles. In fine weather it generally leaves its haunts about twilight, skimming along the ground, exploring the neighbouring woods for prey, and returning before sunrise, not hooting, but repeating a sort of blowing noise, like the snoring of a man who sleeps with his mouth open. Its sharper notes are often interpreted by the superstitious as the presage of approaching dissolution.

- S. passerina*, Tem. Passerine or Little Owl. Plumage grayish-brown, with irregular whitish spots above; whitish, with brown spots beneath; breast pure white; irides yellow; toes thinly covered with white hairs. About nine inches in length. Inhabits Europe. B.—*Selby, Illust.* pl. 26.

- S. Tengmalmi*, Lin. (*S. dasypus*, Bechst.) Tail and wings longer in proportion than the preceding ; upper parts of the body brown, shaded with blackish ; top of the head and neck marked with small whitish rounded spots ; bill and iris yellow ; tarsus and toes downy. Eight inches long. Inhabits Europe.—*Tem. Man.* 94.
- S. acadica*, Lin. (*S. pygmaea*, Bechst.) Upper parts of the body of a deep gray brown, with whitish spots and points ; inferior parts with longitudinal brown spots ; large white spots on the throat and sides of the neck ; tail with four narrow white bands ; feet feathered to the claws ; bill lead-coloured, orange at the base, and yellowish at the point ; iris yellow. Six inches long. Inhabits Northern Europe.—*Tem. Man.* 96.
- S. ferruginea*, Tem. Plumage above of a fine red, below whitish yellow, striped with rufous ; scapulars spotted with whitish yellow ; tail in the female banded with brown. Six inches and a-half long. Inhabits Brazil.—*Tem. Pl. Col.* 199.
- S. nudipes*, Daud. Body above brownish fawn-coloured ; coverts of the wings spotted with white ; under parts dirty white, with brownish spots ; legs naked and brown ; bill blackish. About seven inches long. Inhabits St Domingo.—*Shaw*, vii. 269.

ORDER II.—OMNIVOROUS BIRDS. (*Omnivoræ*.)

Bill middle-sized, robust, sharp on the edges ; the upper mandible more or less convex and notched at the point ; feet with four toes, three before and one behind ; wings of medium size, with the quill-feathers terminating in a point.

The birds which compose this order are gregarious, and monogamous. They nestle on trees, in the holes of old ruins and towers, or in the clefts of trees or rocks. The male and female sit alternately. They live on insects, worms, offals, grains, fruits, &c. and their flesh is generally hard, tough, and unsavoury.

Gen. 1. OPISTHOCOMUS, Illig.—*Phasianus*, Lath.

Bill thick, short, convex, bent at its point ; base dilated laterally ; lower mandible strong, terminated in an angle ; nostrils in the middle of the bill covered above by a membrane ; legs robust ; tarsus shorter than the middle toe ; toes bordered by rudimentary membranes ; the first wing-feather short, the four following graduated, and the sixth the longest.

O. cristatus, Tem. (*Hoatzin*, Ray.) Plumage above brownish white, beneath black ; a space round the eyes naked and rufous ; head crested ; wings with two pale bands ; tail cuneiform, tipped with yellow. One foot ten inches long. Guiana.—*Shaw*, xi. pl. 11.

Gen. 2. BUCEROS, Lin.

Bill long, convex, curved, sharp-edged, of large dimensions,

serrated at the margin, with a horny protuberance near the base of the upper mandible rising into a crest; nostrils behind the base of the bill, covered by a membrane; legs short, muscular; lateral toes equal, the external one united to the second joint; the first three wing-feathers graduated, the fourth or fifth longest.

- B. rhinoceros*, Lin. Rhinoceros Hornbill. Plumage black; tail tipped with white; casque red above; bill about ten inches in length, yellowish, slightly curved, sharp-pointed, irregularly serrated on the edges. Size of the hen turkey, but more slender. Inhabits Java, &c.—*Shaw*, viii. pl. 1.

The singular bill of this species is furnished at the base of the upper mandible with an extremely large process, continued, for a considerable space, in a parallel direction with the bill, and then turned upwards in a contrary direction in the style of a reverted horn. This appendage, which is eight inches long, and four in width at the base, is divided into two portions by a longitudinal black line. Though apparently a formidable weapon, this singular bill is by no means so in reality; for Levaillant assures us, that he often put his hand into it, without feeling the slightest pain, though the bird exerted all its endeavours to wound him. The young is destitute of the horn-like excrescence on the bill.

- B. monoceros*, Shaw. (*B. Malabaricus*, Lath.) Unicorn Hornbill. Plumage black above, with the abdomen and sides of the tail-feathers white; bill yellowish, with compressed casque, black above, and pointed in front. About the size of a raven. Inhabits India.—*Shaw*, viii. 8.

- B. galeatus*, Lath. Galeated Hornbill. Plumage black, with abdomen and tail white, the latter marked by a black bar; bill conical and yellowish, with squarish, convex red casque. Four feet long. Inhabits Papuan Islands.—*Shaw*, viii. 24.

- B. violaceus*, Shaw. Violaceous Hornbill. Violaceous black; sides of the wing and tail-feathers white; bill whitish; casque compressed, obtuse in front, and marked by a black spot. Smaller than the *monoceros*. Inhabits Ceylon.—*Shaw*, viii. 19.

- B. Abyssinicus*, Lath. Abyssinian Hornbill. Black, with white primary quills; the secondaries ferruginous; bill black, and casque abruptly orbicular; neck with protuberances, as in the turkey. Inhabits Abyssinia.—*Shaw*, viii. 21.

- B. coronatus*, Vaill. Crowned Hornbill. Black, with the abdomen, stripe on each side of the hind-head, and tip of the tail white; bill red, and slightly crested. Inhabits Africa.—*Shaw*, viii. 35.

Gen. 3. PRIONITES, Illiger.—*Momota*, Shaw.

Bill of medium size, strong, hard, convex above, bent towards its point, which is compressed; edges of the mandibles serrated; nostrils basal, lateral, oblique, open, but partly concealed by feathers; toes lateral, unequal; the internal very short, joined at its base; the external united to the second joint; wings short; the first three feathers graduated, the fourth and fifth longest.

P. Braziliensis, Cuv. (*Ramphastos momota*, Lin.) Brazilian Saw-bill. Green above, buff-coloured beneath; crown blue, marked with a black spot; the two middle tail-feathers elongated; head large; bill black; legs black, and claws hooked. Size of the thrush. Inhabits Brazil.—*Shaw*, viii. pl. 3.

P. ruficapillus. (*Baryphonus*, Vieill.) Plumage of the wings and back green; primaries and tail blue; top of the head red; upper part of the breast reddish; a patch of black on the front of the neck; tail equal. Fourteen inches long. Inhabits Paraguay.—*Shaw*, xiv. 84.

P. cyanogaster, (*B. cyanogaster*, Vieill.) Blue-bellied Momot. Green above; blue beneath; tail cuneated. Length fourteen inches and a-half.—Inhabits Paraguay.

Gen. 4. CORVUS, Lin.

Bill straight at its origin, thick, compressed on the sides, bent towards the point, and edged; nostrils covered by reflected bristly feathers; legs and feet plated; toes, three before and one behind, divided; tarsus longer than the middle toe; wings acuminate, the fourth feather longest.

1.—Crows.

C. Corax, Lin. The Raven. Bill very strong; plumage glossy black, the upper parts with purple reflections; tail strongly rounded; iris with two circles, gray and brown. The young when hatched incline to whitish. Two feet long.—*Selby*, *Illustr.* pl. 27.

The Raven is found in every quarter of the globe, and under all climates. Its voracity is proverbial. In Greenland ravens usually haunt the neighbourhood of the sea, assembling in troops during winter around the huts of the natives, plundering the provisions, devouring the offals, or even from hunger pulling the leathern canoes to pieces. On the north-west coast of Hudson's Bay, in Kamtschatka, &c. they prey in concert with the white bear, the arctic fox, and the eagle, greedily seizing the eggs of other birds, shore-fish, and such testaceous and crustaceous animals as happen to be within their reach; and they frequent woody places, in the neighbourhood of towns, for the sake of carrion and other refuse. They are also unsparing of ducklings and chickens, and destroy sickly sheep and lambs. Ravens build their nests in the crevices or in the holes of walls, on the top of deserted towers, or in the forks of large trees. The female lays generally five or six eggs, of a pale bluish green, marked with numerous spots and streaks of brown and ash-colour. Incubation lasts about twenty days, during which period the male assiduously waits on his mate, and not only provides her with abundance of food, but relieves her in turn, taking her place in the nest during part of the day. Ravens live to a great age, some well authenticated cases being on record of their having completed a century. When they croak three or four times, repeatedly extending their wings, and shaking the leaves of the trees on which they are perched, they are said to foretell serene weather. The Greenlanders observe that when they roam about in a restless manner, making a noise in the air, they presage a violent south wind and tempest.

C. corone, Lin. The Carrion Crow. Plumage deep black with violet reflections; tail rounded; bill and feet black; iris hazel-coloured. Eighteen inches long.—*Selby*, *Illustr.* pl. 28.

This species is as widely diffused as the raven, being common in most parts of the world. They feed on flesh, eggs, worms, insects, and various sorts of grain; carrion,

fish, fruits, and even shell-fish, which they contrive to break by dropping them on a hard surface from a height. They often destroy weakly lambs, and, when pressed with hunger, will even pursue birds on the wing. Their creaking in the morning is said to indicate fine weather. Like the raven and other congenious birds the carrion crow may be domesticated, and taught to articulate several words. It has been also observed to manifest the same disposition to hoard provisions and glittering trinkets.

C. cornia, Lin. Hooded or Royston Crow. Plumage of the neck and body ash-coloured; head, throat, wings, and tail black, with bronze reflections; bill and feet black; iris brown. Twenty-one inches long. Inhabits Europe, &c.—*Selby, Illust.* pl. 29.

This species visits the south of England in October, or the beginning of winter, arriving and departing with the woodcock, and retiring north to breed in the beginning of April. In the Orkneys, Hebrides, and Shetland islands, it is the only genuine crow, the rook and carrion crow being there unknown. In these districts, and in some parts of Scotland, it is resident throughout the year. Where opportunities offer, it breeds in the pines and other large trees, in default of which it nestles in the cavities of rocks. The female, which is rather smaller than the male, and of less lively hues, usually lays four, five, or six eggs, of a greenish-blue, marked with many spots of blackish-brown. The Royston crow is remarked for its double cry, of which one is hollow and well known, and the other shrill, and somewhat resembling the crowing of a cock. When other food is wanting, these crows eat cranberries and other mountain fruits. In open fertile countries they live much on grain, worms, and carrion; but they often resort to the sea-shores, and prey on the various animal matters thrown up by the tide. Mr Low, in his Natural History of Orkney, observes, that in that country they meet together in spring, as if to deliberate on the important concerns of summer, and, after flying about in this collected state for eight or ten days, separate into pairs, and betake themselves to the mountains.

C. frugilegus, Lin. The Rook. Base of the bill, nostrils, throat, and part of the head destitute of feathers; plumage of a fine black, with purple and violet reflections; bill straighter and more slender than in the preceding species; mandibles and feet black; iris of a grayish white. About eighteen inches long. Sometimes found white. Inhabits Europe. B.—*Selby, Illust.* pl. 30.

In England Rooks are stationary; but in France, Silesia, and many other countries, a great many migrate. In France they are the forerunners of winter, whereas in Siberia they announce the summer. Their flights are sometimes so dense as to darken the air, being frequently joined, not only by the common crow and the jackdaw, but also by troops of starlings. Every spring they resort to breed on the same trees, preferring the loftier branches, and building sometimes ten or twelve nests, rising one above another on the same tree. They feed chiefly on worms and insects; but in winter, particularly when the ground is covered with snow, they fly to the sea-shore to feed on small shell-fish, particularly the common periwinkle. These last they raise into the air, and drop them among stones to break the shell.

C. monedula, Lin. The Jackdaw. Top of the head of a black colour, changing to violet; occiput and upper part of the neck gray ash-coloured; the rest of the body above black, with a violet reflection; the under parts deep black; iris grayish white. About thirteen inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 31. fig. 1.

Jackdaws feed principally on worms and the larvæ of insects, and are very fond of cherries. Their voice is shriller than that of the rook or crow, and appears to be capable of different inflections. They are easily tamed, and seem so fond of domestication as seldom to attempt their escape. They may be fed on insects, fruit, grain, and even small pieces of meat. With no great difficulty they may be taught to articulate several words; but they are mischievous and tricky, and will secrete not only portions of their food, but pieces of money, jewels, &c.

- C. Jamaicensis*, Lath. Chattering Crow. Of a uniform deep black. Inhabits Jamaica.—*Lath. Ind.* 154.

This scarcely differs in appearance from the European carrion crow, but utters a peculiar chattering note.

- C. Dauricus*, Lath. White-breasted Crow. Plumage black; neck and breast white. 12 inches long. Africa and Asia.—*Lath. Ind.* 154.

2.—Pies.

- C. pica*, Lin. (*Pica Europæa*, Cuv.) The Magpie. Head, throat, neck, top of the breast and back black, with purple and green reflections; the scapulars, breast, belly, and inside of the wing-feathers white; tail lengthened and cuneated; bill, iris, and feet black. 18 inches long. Inhabits Europe.—*Selby, Illust.* pl. 31. fig. 2.

The Magpie is generally diffused in most of the countries of Europe, and it also occurs in Asia. Being smaller than the rook, and with wings proportionally shorter, its flight is neither so lofty nor so well supported; neither does it undertake long journeys, but only flies from tree to tree at moderate distances; yet it is seldom at rest for any length of time, but skips and hops about, and shakes its long tail almost incessantly. Though naturally shy and distrustful, yet it is seldom found remote from human habitations. Magpies generally continue in pairs throughout the year, and at times unite in flocks, when they are very clamorous. They reject hardly any species of animal food or fruits, and devour grain when nothing else is within their reach. They prey on birds, rats, field-mice, young poultry, leverets, feathered game, carrion, fish, insects, &c. They are notorious pilferers and boarders, and conceal provisions or any glittering objects with great address. In their wild state they proclaim aloud any apparent danger, by their chattering note, and thus the fowler is frequently deprived of his sport. In almost every country the appearance of the magpie is, in the minds of the vulgar, associated with superstitious prejudices.

- C. Senegalensis*, Lin. Plumage violet black; tail cuneated; wing and tail-feathers subferruginous. Fourteen inches long. Inhabits Africa.—*Lath. Ind.* 163.

- C. rufiventris*, (*Pica rufiventris*, Vieill.) Crown and nape of the neck grayish blue; throat and primaries black; breast, abdomen, back, and rump rufous; tail cuneiform. Size of the Magpie. Inhabits Eastern Asia.—*Shaw*, xiii. 64.

- C. Caledonicus*, Lath. Plumage ash-coloured, except the tail, which is black; bill and legs black. Fifteen inches long. Inhabits New Caledonia.—*Lath. Ind.* 154.

- C. erythrorhyncos*, Lin. Plumage brown violet, with very long tail; forehead, throat, and breast black; occiput and tips of wings and tail white. Inhabits China.—*Lath. Ind.* 163.

3.—Jays.

- C. glandarius*, Lin. (*Garrulus glandarius*, Cuv.) The Jay. Body of a reddish ash-colour; head white, with black streaks; wing-coverts with blue and black bars; bill and tail black; iris blue; legs dark brown. 13 inches long. Inhabits Europe.—*Selby, Illust.* pl. 32.

This bird is the most elegant of the tribe indigenous to Great Britain. Jays are great depredators of fruit and grain, and also frequently plunder the nests of smaller birds of their eggs and young. When full grown the jay is extremely shy; but if taken from the nest, it evinces great docility. Its common notes bespeak a wonderful flexibility of throat; for it naturally imitates the sounds with which it happens to be most familiar, as the bleating of a lamb, the mewing of a

cat, the cry of a kite or buzzard, the hooting of an owl, the neighing of a horse, &c. These imitations, Col. Montagu observes, are so exact, even in the wild state, that he has been often deceived by them.

C. infustus, Lath. Head blackish; feathers around the nostrils and base of the bill white; upper part of the body gray ash-coloured, lower parts reddish gray; wing-coverts and internal part of the wings, rump, abdomen, and lateral feathers of the tail red; two middle feathers of the tail cinereous; bill black; feet brown. Eleven inches long. Inhabits Europe.—*Tem. Man.* 115.

C. cristatus, Lath. (*Garrulus*, Cuv.) Blue Jay of Catesby. Crested blue above, sub-rosaceous beneath; collar, back, wings, and cuneated tail barred with black. About eleven inches long. Inhabits North America.—*Catesby*, i. t. 15.

C. Stelleri, Lath. Plumage purplish black; abdomen bluish; wings blue in the middle, banded with black; tail blue, cuneated. Fifteen inches long. Inhabits N. America.—*Lath. Ind.* 158.

C. Canadensis, Lin. Plumage brown above, pale cinereous below; forehead and throat yellowish; tail tipped with white. Nine inches long. Inhabits N. America.—*Lath. Ind.* 160.

C. pileatus, Illiger. Slightly crested; head, front, and sides of the neck black; body above, wings and tail azure blue; beneath and tip of the tail white or yellowish. Thirteen inches long. Inhabits South America.—*Tem. Pl. Col.* 58.

Gen. 5. NUCIFRAGA, Briss.

Bill, long, straight, narrowed at the point; upper mandible rounded, longer than the under, both terminated in an obtuse and depressed point; nostrils basal, round, open, concealed by hairs directed forward; three toes before and one behind; tarsus longer than the middle toe; wings acuminate; fourth quill-feather the longest.

N. caryocatactes, Briss. (*C. caryocatactes*, Lin.) Nut-cracker. Plumage rusty brown, with triangular white spots; top of the head and wings blackish; tail fuscous, terminated with white; iris hazel-coloured; bill, feet, and claws black. Length thirteen inches. Inhabits Europe.—*Shan*, vii. pl. 43.

This species, the only one of the genus, inhabits many parts of Europe, and is found even in Siberia and Kamtschatka, but is very rare in this island. Though not stately birds of passage, they sometimes fly from the mountains to the plains; and flocks of them are frequently seen to accompany other birds into different parts of Germany, especially where there are pine forests. They feed on hazel-nuts, acorns, pine-seeds, &c.

Gen. 6. PYRRHOCORAX, Cuv.—*Corvus*, Lin.

Bill of medium size, slender, compressed, bent, slightly notched or smooth; nostrils basal, lateral, ovoid, entirely concealed; legs strong; tarsus longer than the middle toe; toes almost wholly separated; claws strong and bent; wings cuneated, the fourth and fifth feathers longest.

P. pyrrhocorax, Cuv. (The Alpine Crow, Lath.) Plumage of a brilliant black, with purple and green reflections; tail a little rounded; wings shorter than the tail; bill orange yellow; iris brown; feet vermilion red, soles of the feet black. About fourteen inches long. Inhabits mountains in Europe.—*Tem. Man.* 121.

P. graculus, Tem. (Red-legged Crow, Lath.) Plumage black, with green, violet, and purple reflections; wings long; tail square; bill long, pointed, arched, and as well as the legs of a vermilion colour; iris brown; tongue of a saffron yellow. Sixteen inches long. Inhabits mountains of Europe.—*Selby, Illust.* pl. 33.

In Britain this species seems to be principally limited to Devonshire, Cornwall, and Wales; but it is also found in some parts of Scotland and the Hebrides. It appears in immense flocks in Egypt towards the end of the annual inundation of the Nile, when it feeds with the storks and falcons on the reptiles which then abound. With us they are stationary throughout the year. The Cornish peasantry often keep them tame in their small gardens.

Gen. 7. BARITA, Cuv.—*Craticus*, Vieill.

Bill long, strong, convex above, notched at the point, without nasal furrow; nostrils lateral, pierced longitudinally in the bill, covered above and half shut by the corneous substance; legs robust; tarsus longer than the intermediate toe; the external toe united to the first joint, the internal free; back toe long, very strong; wings of medium size or long, the fourth or sixth quill-feathers longest.

B. varia, Tem. (*Gracula*, Shaw.) Plumage black above, variegated with white; white below; lateral tail-feathers tipped with white; bill bluish, apex curved; legs plumbeous. Thirteen inches long. Inhabits New Guinea.—*Shaw*, vii. 464.

B. strepera, Tem. (*Coracias*, Lath.) Plumage black, primaries white at the base; lower coverts of the wing and tail white; tail elongated, round, the feathers white at their base, apex black; wings reaching to the middle of the tail; feet black. Nineteen inches long. Inhabits Norfolk Island.—*Shaw*, xiii. pl. 10.

Gen. 8. GLAUCOPIS, Forst.

Bill of medium size, strong and thick; upper mandible convex, arched, curved towards the tip, covering the edges of the lower, at the base of which is a fleshy membrane or wattle; nostrils basal, lateral; legs robust; tarsus longer than the middle toe; thumb with a long and crooked nail;

G. cinerea, Lath. Body cinereous, nearly black; tail cuneiform, with twelve feathers; bill black, with wattles at the base of a reddish blue colour. Fifteen inches long. Inhabits New Zealand.—*Shaw*, vii. pl. 42.

Gen. 9. GRACULA, Lin.

Bill of medium size, strong, much compressed, convex above, narrow at the point, which is notched in some individuals;

nostrils lateral, open, partly concealed by the feathers of the face; legs robust; tarsus the length of the middle toe; the external toe joined at its base; the internal one free; back toe short; third wing-feather longest.

- G. religiosa*, Lin. Plumage violet black, with a white spot on the wings, and a naked yellow occipital band. $10\frac{1}{2}$ inches long. Inhabits India.—*Shaw* vii. pl. 54.—The only species of the genus.

Gen 10. BUPHAGA, Lin.

Bill strong, thick, obtuse; inferior mandible stronger than the superior, both gibbous at the point; nostrils basal, half shut by an arched membrane; tarsus longer than the middle toe; wings of medium size, first wing-feather very short, the second almost as long as the third.

- B. Africana*, Lin. African Ox-pecker. Ferruginous-brown above, pale beneath; tail feathers sub-acuminated. Size of a lark; Eight inches in length. Inhabits Africa.—*Shaw*, viii. pl. 6.

Gen 11. BOMBYCIVORA, Tem.—*Ampelis*, Lin.

Bill short, straight, elevated; the upper mandible slightly curved towards the extremity, with a marked tooth; nostrils basal, ovoid, open, concealed by rough hairs directed forward; three toes before, and one behind, the exterior joined to that in the middle; wings of moderate size, with the first and second quills the longest.

- B. garrula*, Tem. (*Ampelis garrulus*, Lin.) The Bohemian Chatterer. Back of the head crested; length nearly eight inches. Size about that of a starling. Inhabits Europe, Asia, and America.—*Penn. Brit. Zool.* i. pl. 48.

Gen 12. PTILONORYNCHUS, Kuhl.

Bill short, strong, depressed at the base, bent, point notched; inferior mandible gibbous in the centre; nostrils basal, lateral, round, concealed by the feathers; legs short, robust; tarsus longer than the middle toe, which is united to the exterior one to the first joint; posterior claw strong, curved; the fourth and fifth wing-feathers longest.

This genus is formed from three exotic species, viz. *P. violaceus*, of a brilliant violet colour, the female olive; *P. viridis*, body of a fine green; and *P. niger*, glossy black colour.

Gen 13. CORACIAS, Lin.

Bill compressed, higher than broad, straight; the upper mandible bent towards the point; nostrils linear, lateral; legs short, stout, and formed for walking; three toes before and one behind, entirely divided; wings long, with the first quill somewhat shorter than the second.

- C. garrula*, Lin. (*Galgulus garrulus*, Vieill.) Garrulous Roller.

The plumage of the head and neck blue with green reflections; tail nearly even; wings varied with blue, sea-green, and black; back and scapulars fawn-coloured; wing-coverts and rump of a rich ultramarine blue; iris with a double circle of brown and gray; feet yellowish; bill black, brownish at the base. Thirteen inches long. Inhabits Europe.—*Shaw*, vii. pl. 50.

This is the only one of the family known in Europe. It roams as far north as Sweden, and a few stragglers have been met with in England.

C. Bengalensis, Lath. Bengal Roller. Plumage sub-fulvous, bluish beneath; the under part of the neck striated with pale violet; tail entire. 12 inches long. Inhabits Bengal.—*Lath. Ind.* 163.

C. Senegalensis, Lath. Plumage reddish brown; the tail, wings, and upper parts bluish; face white; exterior tail-feathers longest. Eighteen inches long. Inhabits Africa.—*Lath. Ind.* 169.

Gen. 14. COLARIS. Cuv.

Bill short, strong, depressed, dilated on the sides, much broader than deep, ridge rounded, point a little crooked, with or without notch; inferior mandible in part concealed by the margin of the upper; nostrils basal, long, diagonally cleft, half shut by a membrane covered with feathers; legs short; tarsus shorter than the intermediate toe; the anterior toes joined at their base; wings long, the second feather longest.

C. orientalis, Tem. (*Coracias orientalis*, Lath.) Quill-feather varied with sea-green and blue; abdomen blue green; throat and base of the tail blue. 10 inches long. Inhabits India.—*Briss.* ii. t. 7. fig. 2.

C. Madagascariensis, Tem. (*Coracias*, Lath.) Plumage above purple ferruginous, inclining to blossom colour beneath; quill-feathers blue black; rump, vent, and tail blue green, tipped with purplish black. Ten inches long. Inhabits Madagascar.—*Buff. Ois. Pl. Enl.* 501.

C. afra Tem. (*Coracias afra*, Lath.) Plumage above rufous brown, lilac-coloured beneath; wings blue; tail sea-green, with blue black tip. 8 inches long. Inhabits Africa.—*Shaw. Nat. Mis.* pl. 401.

Gen. 15. ORIOLES, Tem.

Bill in the form of a lengthened cone, horizontally compressed at the base, and edged; the upper mandible surmounted by a ridge, notched at the point; nostrils basal, lateral, naked, and horizontally pierced in a large membrane; tarsus shorter than, or of the same length as, the middle toe, which is joined to the exterior one; wings with the first quill very short, the third the longest.

O. galbula, Lin. Golden Oriole. Body and tip of the tail gold-yellow; wings, tail, and cere black; bill chestnut coloured; iris red; legs bluish gray. 10 inches long. Europe, &c.—*Shaw*, vii. pl. 53.

- O. melanocephalus*, Lin. Plumage purplish blue, head and neck black ; beneath white ; quill-feathers fuscous ; tail cuneiform, tip white. Inhabits China. Size of the jay.—*Lath. Ind.* 172.
- O. paradisea*, Tem. (*Paradisaea aurea*, Lath.) Plumage brownish yellow, with the breast, wings, and tail-feathers black. Eight inches long. Inhabits India.—*Edwards*, t. 112.

Gen. 16. *ICTERUS*, Tem.—*Graculus Oriolus*, Lin.

- Bill longer than the head, or as long, straight, like an elongated cone, pointed, sharp, a little compressed, without distinct ridge or notch, the base covered by feathers ; margins of the mandibles more or less bent inwards ; nostrils basal, lateral, and covered by a horny rudiment ; tarsus as long as or longer than the middle toe ; wings long, third and fourth feathers longest.
- I. cristatus*, Tem. (*Oriolus cristatus*, Lath. *Cassicus*, Daud.) Crest black ; the lower part of the back, rump, and vent chestnut ; lateral tail-feathers yellow. Eighteen inches long. Inhabits S. America.—*Buff. Ois. Pl. Enl.* 344.
- I. quisculus*, Tem. (*Gracula quiscula*, Lin.) Plumage glossy purple, black ; tail long, round ; bill and legs black ; iris silver-coloured. Nearly a foot long. Inhabits Mexico, &c. *Catesb. Car.* i. pl. 12.
- I. baritus*, Tem. (*Gracula barita*, Lin.) Plumage blackish, with a gloss of purple and green on the upper parts ; bill blackish, base naked ; tail rounded, concave above. Thirteen inches long. Inhabits N. America.—*Sloane, Jam.* t. 257. fig. 2.
- I. Americanus*, Tem. (*Oriolus*, Lath.) Plumage black, with deep-red chin, throat, and breast ; border of the wings red. Smaller than a blackbird. Inhabits Guiana.—*Shaw*, vii. 428.

Gen. 17. *STURNUS*, Lin.

Bill straight, in the form of an elongated cone, depressed, slightly obtuse ; base of the upper mandible projecting on the forehead, the point much depressed, and without a notch ; nostrils basal, lateral, half closed by an arched membrane ; wings long, the first quill very short, the second and third longest ; three toes before, and one behind, the exterior joined at its base to the middle one.

Starlings feed principally on insects, nestle in the holes of trees, under the tiles of roofs, and in the holes of walls. Like many of the omnivorous order, they consort and travel in large flocks. The males and females differ little in general aspect ; but the young of the first year are very dissimilar to the mature birds. They are found in every quarter of the globe.

S. vulgaris, Lin. Common Starling or Stare. Body shining brassy black, spotted with little triangular spots of reddish white ; lower coverts of the tail bordered with white ; bill yellow ; legs brown flesh-colour ; eight inches long.—Inhabits Europe.

Stares occur abundantly in the old continent, from Norway to very southern lati-

tudes. Their general food consists of insects and their larvæ, snails, earth-worms, grains, seeds, berries, &c. Fifty-seven individuals of this species were once killed at a single shot near Kirkwall in Orkney, where they are as common as sparrows elsewhere, and flocks of them perch on every wall and chimney top. The flight of stares is not undulatory, but smooth and even; and they walk very nearly in the manner of a wagtail; but when they assemble in flocks their movements are noisy and tumultuous, describing a sort of vortex, combined with an advancing progress. They chatter much in the evening and morning, both when they assemble and when they disperse. On the approach of predaceous birds they rally in close array, and usually succeed in driving them off. The kings of Persia used to have starlings trained to hunt butterflies; but they are now principally tamed for their imitative talent, which enables them to whistle simple airs. They also articulate very distinctly, and may be taught to repeat words.

S. unicolor, Tem. Plumage of the body, the wings, and the tail, of a shining black, with light purple reflections; base of the bill blackish, point yellow; legs yellowish brown. Eight inches long. Inhabits Sardinia.—*Tem.* 33.

S. Capensis, Lin. Cape Starling. Plumage blackish, with white spots on the wings and neck; sides of the head and belly white; bill yellowish at the base, the apex reddish. Inhabits Cape of Good Hope.—*Buff. Ois. Pl. Enl.* 280.

S. Ludovicianus, Lin. Plumage spotted with brown and gray; yellowish beneath; a white line on the head and eyes; throat black; bill whitish; four lateral tail-feathers white. Nine inches long. Inhabits America.—*Buff. Pl. Enl.* 256.

S. militaris, Lin. Plumage grayish; breast and throat reddish; a white spot behind and under the eyes: vent and tail black. Eight inches long. Inhabits S. America.—*Buff. Pl. Enl.* 113.

S. carunculatus, Gmel. Black, with the back and wing-coverts ferruginous; base of the under mandible with a yellowish wattle or caruncle. Ten inches long. New Zealand.—*Lath. Syn.* iii. t. 36.

Gen. 18. PASTOR, Tem.—*Turdus*, *Gracula*, Gmel.

Bill in the form of an elongated cone, edged, much compressed, slightly arched, point feebly notched; nostrils basal, lateral, ovoid, half shut by a membrane furnished with small feathers; legs robust; three toes before and one behind, the exterior joined at the base to the middle one; wings with the first quill-feather very small, the second and third longest.

They fly like the starling in great flocks, and follow cattle, alighting on their backs for the insects on their bodies. The greater number of the species have accessory appendages on their head, either crests or caruncles. The young always want these, their head being only covered with short and rounded feathers.

P. roseus, Tem. (*Turdus roseus*, Lath.) Head tufted; the neck and the top of the breast black with violet reflections; abdomen and back of a fine rose-colour; wings and tail brown-violet; coverts of the wings bordered with clear rose-colour; those of the tail and thighs black, banded with whitish; feet yellowish; iris deep brown. Eight inches long. Asia and Africa.—*Shaw*, x. pl. 26.

P. calvus, Tem. (*Gracula calva*, Lin.) Plumage cinereous, gray-

ish below ; head naked on both sides ; breast, wing, and tail-feathers blackish brown. Ten inches long. Inhabits Philippine Islands.—*Shaw*, vii. pl. 36.

P. tristis, Tem. (*Paradisea tristis*, Lin.) Plumage brown ; head and neck blackish ; a naked triangular red space behind each eye ; a white spot at the tip of the wing and tail-feathers. Nine inches long. Inhabits Philippine Islands.—*Buff. Pl. Enl.* 219.

P. cristatellus, Tem. (*Gracula cristatella*, Lin.) Plumage black, with frontal crest ; base of the primaries and apex of the tail-feathers white ; bill yellow. $8\frac{1}{2}$ inches long. China.—*Shaw*, vii. pl. 55.

P. gallinaceus, Tem. (*Gracula carunculata*, Gmel.) Plumage ash-coloured ; circle round the eyes naked ; base of the inferior mandible with a double wattle ; head with a yellow, erect bifid membranaceous crest. Six inches long. Inhabits Cape of Good Hope.—*Lath. Ind.* 324.

P. pagodarum, Tem. (*Turdus pagodarum*, Lath.) Crest grayish ; body, wings, and tail black ; belly streaked with white ; vent white ; feathers of the neck long ; bill black ; legs yellow. Inhabits India.—*Lath. Ind.* 332.

Gen. 19. PARADISEA, Lin.

Bill of medium size, straight, quadrangular, pointed, a little convex above, compressed ; ridge between the feathers of the forehead ; nostrils basal, marginal, open, but entirely concealed by the feathers ; legs short ; tarsus longer than the middle toe ; lateral toe unequal, the internal one united to the second joint ; back toe longer than the others, robust ; wings with the five first feathers staged ; the sixth or seventh longest.

P. apoda, Lin. (*P. major*, Shaw.) Great Bird of Paradise. Plumage cinnamon-coloured ; throat golden green ; head luteous ; side feathers extremely long, floating, yellow, the two intermediate tail-feathers long, setaceous. Length from bill to tip of side feathers about two feet. Inhabits the Moluccas.—*Shaw*, vii. pl. 58.

The name Apoda applied to this beautiful bird had its rise from the specimens procured by the early travellers having the feet cut off ; and of course all the stories of these birds perpetually floating in the atmosphere, or suspending themselves, for a short time, by the naked shafts, and that they never descended to the earth till their death, are founded in fable. The great birds of paradise are found in the Molucca Islands, and in those surrounding New Guinea, particularly Papua and Aru, where they arrive with the westerly, or dry monsoon, and whence they return to New Guinea, on the setting in of the easterly, or wet monsoon. They are seen going and returning in flights of thirty or forty, conducted by a leader, which flies higher than the rest, and crying like starlings in their progress, preserving their light plumage by invariably moving against the wind. Their food is not known with certainty.

P. minor, Shaw. Plumage cinnamon-coloured, with luteous crown and back, and gold-green throat ; side-feathers yellow, extremely long and floating. 18 inches in total length. New Guinea.

P. sanguinea, Shaw. Plumage cinnamon-coloured, with luteous occiput and back, gold-green front, and long floating sanguine-

red side feathers, and two broad naked shafts. Body 9 inches long, to the tip of the flowing feathers 13 inches.—*Shaw*, vii. pl. 59.

P. magnifica, *Shaw*. Plumage orange-chestnut above, top of the head and back deeper than the rest, the head sometimes inclining to purple; tips of the wings and tail brown; throat blackish purple; breast, belly, and thighs of a deep changeable golden-green, inclining to blue down the middle of the breast; a double ruff of setaceous orange-coloured and yellow feathers on the neck, tipped with black; bill and legs yellowish brown. Inhabits New Guinea.—*Shaw*, vii. pl. 62.

P. regia, *Lin*. Royal Bird of Paradise. Plumage red chestnut, with a golden pectoral band; the two middle tail-feathers filiform, with lunated feathered tips. Five to seven inches long. Inhabits Indian Islands.—*Shaw*, vii. pl. 67.

This is the smallest of the tribe, not exceeding the size of a lark, and usually measuring five inches, or five inches and a-half, in length, without reckoning the two middle tail-feathers, which are about six inches long, in the form of naked shafts, divaricating as they extend, and each terminating in a moderately broad gold green web, rising from one side only of the shaft, and disposed into a flat spiral, of nearly two convolutions.

P. superba, *Shaw*. Bill black, with velvet-like black feathers rising into a bifid crest at its base; forehead shining golden-green; throat and sides of the neck glossy purple, with the feathers of a rounded form; lower part of the breast with a broad band of blue green feathers of a golden hue, diverging and lengthened like a forked wing; the rest of the plumage, with the wings, brownish black; wing-coverts broad, falciform feathers on the shoulders appearing like double wings; legs black. Inhabits New Guinea.—*Shaw*, vii. pl. 63.

P. sexsetacea, *Lath*. (*Parotia aurea*, *Vieill*.) Golden-breasted Bird of Paradise. Plumage velvet-black; hind-head and breast golden-green; side feathers lengthened, and loose-webbed; head furnished on each side with three very long naked shafts, five or six inches in length, and terminating in broad oval webs; tail composed of twelve graduated feathers, of a rich velvety black colour, some of these feathers with long, separated, and floating webs; bill black; iris yellow; feet blackish. From ten to eleven inches in length. Inhabits New Guinea.—*Shaw*, vii. pl. 66.

Gen. 20. LAMPROTORNIS, *Tem*.

Bill of medium size, convex above, compressed at the point, which is notched; base depressed, and ridge between the feathers of the forehead; nostrils basal, lateral, ovoid, half shut by an arched membrane, often covered by feathers; legs long; tarsus longer than the intermediate toe; internal toe joined at its base, the external free; wings, the fourth and fifth quill-feathers longest.

All the species are of the Old Continent, the greater part from Africa. Their plumage is brilliant, shining with metallic lustre. In their habits they resemble the Stares.

- L. gularis*, Tem. (*Paradisæa gularis*, Lath.) Plumage purplish-black; back and under parts blackish gold-green; the throat golden-copper-coloured, and the tail very long and cuneated. Size of a blackbird. Inhabits the Moluccas.—*Shaw*, vii. pl. 70.
- L. auratus*, Tem. (*Turdus auratus*, Lath.) Plumage golden-green, with the head, neck, and body below violet; tail and bands of the wings blue; bill fuscous; iris yellow. Eighteen inches long. Inhabits Africa.—*Buff. Pl. Enl.* 504.
- L. nitens*, Tem. (*Turdus nitens*, Lin.) Plumage green, with a bright violet-coloured spot on the coverts of the wings. Nine inches long. Inhabits Cape of Good Hope.—*Edw.* t. 320.
- L. atratus*, Tem. (*Tanagra atratus*, Lin.) Plumage glossy black; back subviolaceous; bill black. Size of the Thrush. Inhabits India.—*Lath. Ind.* 430.
- L. metallicus*, Tem. Feathers of the head, nape, neck, in front and back elongated, and glossed with metallic purple, violet, and green; back and body beneath purple; wings and tail metallic green. Nine inches long. Inhabits Timor.—*Tem. Pl. Col.* 266.
- L. erythrophrys*, Tem. Orbits and ears black; vent yellow; wings green, the tips of the quills brown; tail olivaceous, the two middle feathers whitish-yellow towards the tip; feathers of the forehead stiff, shining, and of a vermilion colour. 9 inches long. Inhabits Java.—*Tem. Pl. Col.* 267.

ORDER III.—INSECTIVOROUS BIRDS. *Insectivoræ.*

Bill middle sized or short, straight, rounded, slightly edged or awl-shaped; upper mandible curved and notched at the point, most frequently furnished at the base with some coarse hairs, pointing forwards; feet with three toes before and one behind, articulated on the same level, the exterior united at its base, or to the first joint of the middle toe.

The voice of these birds is distinguished by its harmony and cadence. Most of them chiefly subsist on insects, especially during the breeding season, but many of them have likewise recourse to berries. They have usually more than one brood in the year, and inhabit woods, bushes, or reeds, in which they build solitary nests.

Gen. 1. *TURDUS*, Lin.

Bill middle-sized, sharp edged, tip compressed and recurved; upper mandible notched near the point; detached hairs at the opening of the mandibles; nostrils basal, ovoid, lateral, half concealed by a naked membrane; tarsus longer than the middle toe, to which last the outer is united at the base.

This genus, numerous in species, is divided by Temminck into two sections,—those which inhabit woods and thickets in the lower grounds, and those which live solitary in rocky and mountainous situations. Many of the European species migrate in large flocks, whilst others are sedentary, especially in the south of Europe. Most

of them have been remarked for their notes, and many of them are reckoned as late singers.

T. viscivorus, Lin. Mistle Thrush. Plumage gray-brown above, whitish yellow beneath, varied with dusky spots, the three outer tail-feathers tipped with white; coverts of the wings bordered and terminated with white. Eleven inches long. Inhabits Europe. B.—*Selby, Illust. pl. 44, fig. 1.*

This is the largest of the European thrushes, and varies considerably in colour. It inhabits Europe as far northward as Norway, and is common in Russia, but not found in Siberia. In most of the temperate parts of Europe it is partly migratory, and partly stationary. When disturbed or agitated, it utters a shrill grating scream, which is its usual note in autumn and winter. The male shares the duties of incubation, but ceases his song when the young are hatched.

T. pilaris, Lin. The Fieldfare. Head, neck, and lower part of the back ash-coloured; top of the back and wing-coverts chestnut; space between the eye and bill black, and a black line above the eye; throat and breast bright red, with black triangular spots; belly pure white; tail black. Ten inches long. Inhabits Europe, &c.—*Selby, Illust. pl. 45, fig. 1.*

The Fieldfare in this country is a migratory bird. It generally arrives in November in numerous flocks, and frequently remains till the beginning of April, though it often takes its departure in March. This bird builds in the pine forests of Norway, Sweden, and Lapland, laying from three to five eggs of a pale bluish-green colour, spotted with reddish brown. Its flesh was highly prized by the ancient Romans, who fattened fieldfares for the table.

T. musicus, Lin. The Throstle or Thrush. Plumage gray-brown above, yellowish red beneath, varied with dusky spots; space between the eye and bill yellowish; belly and flanks white, with oval brown spots; legs gray brown. Nine inches long. Inhabits Europe.—*Selby, Illust. pl. 45, fig. 2.*

Var. From white to different shades of brown, reddish, or yellow.

T. iliacus, Lin. Red-wing Thrush. Plumage olive brown above; space between the eye and bill black and yellowish; a broad whitish band above the eyes; inferior wing-coverts and flanks of a bright red; sides of the neck, breast, and belly sprinkled with numerous longitudinal blackish spots; belly white. 8 inches long. Northern Europe. B.—*Selby, Illust. pl. 45, fig. 3.*

T. rufus, Plumage ferruginous above, beneath paler and spotted; quills unspotted; tail rufous, rounded. Eleven inches long. Inhabits N. America.—*Shaw, x. 191.*

T. torquatus, Lin. Ring-Ouzel. Plumage dusky, with a white collar; bill blackish; palate and opening yellow; iris hazel-coloured; legs blackish brown. Ten inches long. Inhabits Europe. B.—*Selby, Illust. pl. 44, fig. 2.*

T. merula, Lin. The Blackbird. Plumage black; bill and feet tawny yellow; iris and legs black; a yellow circle around the eyes. 9 inches long. Inhabits Europe.—*Selby, Illust. pl. 43, fig. 2.*

The Blackbird inhabits the greatest portion of the temperate regions of Europe and Asia. The male begins his song in the first fine days of spring, and, except during the period of moulting, continues it till the commencement of winter. This

species breeds twice or thrice in the year, placing its nest in thick bushes, at a moderate height from the ground, or on old trunks of pollards.

- T. atrogularis*, Tem. Face, cheeks, top of the breast, and neck deep black, shading to cinereous; lower part of the breast and middle of the belly whitish, shading to reddish; lower tail-coverts reddish, terminating in white; upper parts cinereous, deeper on the head; wing-coverts banded with yellowish; bill blackish brown; the lower mandible yellow at its base; iris and legs brown. Ten inches long. Inhabits Germany.—*Tem. Man.* 170.
- T. Naumanni*, Tem. Top of the head deep brown, the other superior parts cinereous red, shading to deeper red, which is the colour of the sides of the neck, the rump, and lateral feathers of the tail; scapulars bordered with red, and spots of the same colour on the flanks and abdomen; middle of the belly and thighs white; bill and legs brown. Nine inches long. Inhabits Hungary, &c.—*Tem. Man.* 170.
- T. saxatilis*, Lath. Head and top of the neck of a blue cinereous or lead colour; upper parts blackish brown, with a broad space on the middle of the back white; wings and middle feathers of the tail brown; the other tail-feathers and the lower parts of a lively red; inferior coverts of the tail terminated by white. 7 inches long. Inhabits mountains in Europe, &c.—*Shaw*, x. 266.
- T. cyaneus*, Lin. Blue Thrush. All the upper parts, the wings and tail excepted, deep blue; lower parts paler blue; the throat and neck without spots, but all the inferior parts with black narrow crescent-shaped lines towards the end of the feathers; wings and tail black, margined with gray; bill and feet black. 8 inches long. Inhabits Southern Europe.—*Shaw*, x. 224.
- T. Orpheus*, Lin. Mocking Thrush or Mocking Bird. Plumage gray-brown above, grayish-white beneath; lateral tail-feathers and spot on the wings white; bill blackish-brown; iris yellow, above the eyes white; rump gray-blue; legs black or cinereous. Size of the blackbird. Inhabits America.—*Shaw*, x. pl. 20.
- This species occurs in North America, especially in its more temperate regions, and in several parts of the West Indies. Its power of imitation has been often noticed. Thus, one of them confined in a cage has been heard to mimic the mewing of a cat, the chattering of a magpie, and the creaking of the hinges of a sign-post in high winds. On account of the diversified and imitative character of its notes, the Mexicans call it by a name which signifies *the bird of a hundred tongues*.
- T. jocosus*, Tem. (*Lanius jocosus*, Lin.) Head crested, black; throat white; body grayish; lower palpebræ purple; vent bright red; the four lateral tail-feathers tipped with white. Seven inches and a-half long. Inhabits China.—*Buff. Pl. Enl.* 508.
- T. hæmorhausus*, Tem. (*Musicapa hæmorhausus*, Lath.) Plumage fuscous, waved; crest and tail black; breast and abdomen white; vent red. $4\frac{1}{2}$ inches long. Inhabits Ceylon.—*Brown*, *Ill.* t. 31.
- T. Cayanensis*, Tem. (*Merops Cayanensis*, *Turdus punctatus* and *Manillensis*, Lath.) Plumage brownish green; wings and tail

red ; base of the quill-feathers white, the rest black ; bill black ; legs yellowish. Eight inches long. Inhabits Cayenne.—*Buff. Pl. Enl.* 454.

T. migratorius, Lath. Plumage grayish ; bill yellow, and blackish at its extremity ; three white spots on the sides of the head ; tail black, bordered with gray ; fore part of the neck, breast, and belly, of a bright red ; lower part of the belly white. Nine inches long. Inhabits North America.—*Buff. Pl. Enl.* 556.

T. vociferans, Swainson. Body cinereous above, ferruginous below ; with the ears and sides of the head black ; tail rounded, its middle feathers black, and lateral ones ferruginous. $7\frac{1}{2}$ inches long. Inhabits Southern Africa.—*Swains. Zool. Ill.* iii pl. 80.

T. clamosus, Lath. Plumage olive green above, paler beneath, the quills edged with yellow. Seven inches long. Inhabits Africa.—*Vaill. Ois. d'Afrique.* iii. pl. 106, fig. 2.

Gen. 2. CINCLUS, Bechst.—*Hydrobata*, Vieill.

Bill rather slender, slightly bent upwards, compressed at the sides ; point of the upper mandible bent over the lower ; nostrils basal, lateral, longitudinally cleft, and partly covered by a membrane ; head small ; three toes before and one behind, the exterior joined at its base to the middle one ; tarsus longer than the middle toe ; wings short.

C. aquaticus, Bechst. European Dipper. Upper parts of the body of a deep brown, tinted with ash-colour ; throat, front of the neck and breast pure white ; belly red ; bill blackish ; iris pearl-coloured ; feet horn-colour. 7 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 45.*

This singular bird feeds on aquatic insects, and in consequence is found always near the margins of clear streams. With the structure of a land-bird, and incapable of diving or swimming, it nevertheless advances into the water in pursuit of its prey, walking on the bottom and completely covered.

Gen. 3. MENURA, Shaw.

Bill at its base broader than deep, straight, somewhat slender, inclined at the point, which is notched, and furnished at the base with setaceous plumes, pointing forwards ; lower mandible shortest ; nostrils oval, large, covered with a membrane, and situated in the middle of the bill ; claws as long as the toes, broad, convex above, obtuse ; wings short, concave.

M. superba, Lath. Plumage above brown, inclining to rufous on the wings and neck, ashy-brown below ; tail of sixteen loose-webbed feathers. Size of a hen pheasant. New South Wales.—*Vieill. Ois. de Parad.* pl. 14.

Gen. 4. PITTA, Vieill.

Bill of medium size, strong, hard, compressed through its whole length, slightly inclined from its base, bent at the point,

slightly notched ; ridge elevated at its base ; nostrils basal, lateral, half shut by a naked membrane ; legs long, slender ; tarsus often double the length of the intermediate toe ; the internal toe united to the first joint ; wings short, rounded, the three first feathers equally graduated, the fourth and fifth longest ; tail short, equal, or rounded.

P. cyanura, Tem. (*Turdus cyanurus*, Lath.) Plumage chestnut-coloured ; yellow, streaked with blue beneath ; head banded with black ; tail and transverse pectoral band blue. $8\frac{1}{2}$ inches long. Inhabits Guiana.—*Shaw*, vii. pl. 47.

P. brachyura, Tem. (*Corvus brachyurus*, Lin.) Plumage green, yellowish beneath, with three black stripes on the head ; shoulders and tail-coverts blue ; vent red. 7 inches long. Inhabits Ceylon.—*Shaw*, vii. pl. 48.

P. versicolor, Swainson. Plumage greenish above, fulvous below, with the rump and tail-feathers blue ; vent red ; crown rufous ; nape, chin, and abdominal spot black. 9 inches long. Inhabits New Holland.—*Zool. Journ.* i. 468.

P. erythrogastra, Tem. Crown, occiput, and cheeks reddish brown ; neck and throat dusky, with a rosy spot ; back, scapulars, and pectoral fascia blue-green ; wing-coverts, rump, and tail blue ; abdomen and vent red. $6\frac{1}{2}$ inches long. Inhabits Philippine Islands.—*Tem. Pl. Col.* 212.

Gen. 5. MYIOTHERA, Illig.

Bill long, straight, convex above, ridge a little arched, point bent suddenly, notched ; lower mandible conical and a little turned up at the point ; nostrils basal, lateral, half concealed by a membrane ; legs long or of medium size, slender ; lateral toes nearly equal, the internal one united to the first joint ; wings short, rounded ; the fourth and fifth feathers longest ; tail short and equal, or long and graduated.

M. grallarius, Tem. (*Turdus grallarius*, Lath. *Grallaria*, Vieill.) Plumage ferruginous brown above, paler beneath ; occiput cinereous ; legs long, bare a little above the knee, and of a reddish flesh-colour ; tail extremely short. Size of the missel thrush. Inhabits Guiana.—*Shaw*, vii. pl. 49.

M. tinniens, Tem. (*Turdus tinniens*, Lath. *Grallaria*, Vieill.) Plumage brown above, whitish beneath, the breast mottled with dusky ; tail moderately long ; legs pale, plumbeous ; bill black above, white below. 7 inches long. Ceylon.—*Shaw*, x. 306.

This species has its name from its shrill and loud tinkling cry, which has been compared to the alarum of a clock, and is continued for nearly the space of an hour during the mornings and evenings.

M. ferruginca, Tem. Plumage black, varied with white above ; ferruginous below ; throat variegated with red, white, and black ; eyebrows, tip of the wing-coverts, and tail-feathers white. 5 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 132, fig. 3.

M. navia, Tem. (*Pipra navia*, Lath. *Conophaga*, Vieill.) Plumage brown above, fulvous beneath; throat and jugulum black; breast and upper part of the belly white, spotted with black; wings with two white bars; lower belly, thighs, and vent orange. 4 inches long. Inhabits Cayenne.—*Buff. Pl. Enl.* 323. fig. 2.

M. mentalis, Tem. (*Formicivora*, Swainson.) Plumage above ashy green, the wings and tail deeper, with a brown hue; clear yellow below; throat silvery gray, and a large black spot on the ear-feathers; the lesser coverts dusky, with white lunules. 4 inches long.—*Shaw*, xiii. pl. 54.

Gen. 6. THAMNOPHILUS, Vieill.—*Lanius*, Lath.

Bill short, strong, thick, a little gibbous, widened at the base, dilated on the sides, compressed towards the point, which is obtuse, much bent and notched; nostrils lateral, a little distant from the base, pierced in the horny bill, rounded or oval, open; legs long and slender; tarsus much longer than the intermediate toe; the external toe united to the first joint; wings short, rounded, the fourth, fifth, and sixth quill-feathers equal and longest.

The Thamnophili are found in America, from Canada to Paraguay. They inhabit thick bushes, and feed chiefly on caterpillars and insects.

T. doliatus, Tem. Plumage transversely striped with black and white; tail rounded; feathers of the head long, tipped with black, capable of erection. 6 inches long. Inhabits Cayenne.—*Lath. Ind.* 80.

T. atricapillus, Tem. Plumage of the crown, neck, shoulders, and wings black; body above mouse-coloured; below bluish gray; wings short; tail, except the two middle feathers, tipped with white, and cuneated. 5 inches long. Inhabits Surinam.—*Lath. Ind.* 73.

T. naevius, Tem. Plumage black above, cinereous below; back, wings, and tail spotted with white. 5 inches long. Inhabits Cayenne.—*Lath. Ind.* 81.

T. bicolor, Swainson. Head much crested; plumage of the upper parts deep black; of the under parts pure white; tips of the wing-coverts, margins of the quills, and interrupted bands on the tail white; irides crimson. 8 inches long. Inhabits Brazil.—*Zool. Journ.* iii. 86.

Gen. 7. VANGA, Vieill.—*Lanius*, Lin.

Bill long, hard, edged, bent at its point, which is crooked and sharp; nostrils lateral, a little distant from the base, in the horn of the bill, covered above by a cartilage; base of the bill with stiff hairs; tarsus as long or longer than the intermediate toe; the external toe united to the first joint; the third quill-feather longest.

V. curvirostris, Tem. Back and wings black ; coverts and smaller quill-feathers edged with white ; tail black ; the remainder of the body white ; bill and legs black. 10 inches long. Inhabits Madagascar.—*Buff. Pl. Enl.* 228.

Gen. 8. *LANIUS*, Lin.

Bill middle-sized, robust, straight from its origin, and much compressed ; upper mandible strongly bent towards the tip, which is hooked, the base destitute of a cere, and furnished with rough hairs, pointing forwards ; nostrils basal, lateral, almost round, half closed by an arched membrane, and often partly concealed by hairs ; tarsus longer than the middle toe ; three toes before and one behind, separate ; the third and fourth wing-feathers longest.

Butcher-Birds are so denominated from their singular habit of sticking their prey upon the thorns of bushes before feeding on it. After killing a bird, or large insect, they affix the body to some sharp thorn ; for these birds want the strength of the hawk to retain their quarry in their claws, and pull it with their bill. They likewise spit the larger insects on thorns before devouring them, reserving them, according to some, or using them, according to others, as a decoy to the insectivorous birds.

L. excubitor, Lin. Greater Butcher-Bird or Shrike. Plumage gray above, white beneath ; wings short, black ; a broad black band below the eyes ; origin of the primaries and the extremities of the secondary quills pure white ; the two exterior feathers of the tail white, the third black towards the centre, the fourth terminated by a large white space, and the two centre ones entirely black ; bill and legs deep black. Nine inches long.—*Shaw*, vii. pl. 37.

L. meridionalis, Tem. Head, neck, and back of deep ash-colour ; a broad black band under the eyes ; throat whitish ; lower parts of a reddish ash-colour ; origin of the first quill-feathers and extremities of the secondaries pure white ; four middle feathers of the tail black. Nine inches long. Europe.—*Tem. Man.* 143.

L. minor, Lin. The Gray Shrike. Plumage cinereous above ; throat white ; breast and flanks rose-coloured ; forehead, region of the eyes and ears black ; wings black ; four middle feathers of the tail black. Nine inches long. Inhabits Europe.—*Tem. Man.* 144.

L. rufus, Briss. Forehead, region of the eyes and ears black ; occiput and nape of a bright red ; top of the back and wings black ; extremities and margins of the coverts white, as are the lower parts of the body ; first feather of the tail white, with a black square spot on the interior web ; the second with a larger spot on both webs, the others white at their origin, and towards the end ; the two middle ones black ; tail slightly rounded. Seven inches long. Inhabits Europe.—*Tem. Man.* 146.

L. collurio, Lin. Red-backed Shrike. Back and wing-coverts reddish brown ; back of the head and neck gray ; throat and vent white ; breast, belly, and flanks rose-red ; tail wedge-shaped, the middle feathers black, the rest with more or less white at the base.

tipped with white ; legs and feet black. $7\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 43, fig. 2, 3.

The Red-backed Shrike transfixes the larger insects, particularly the chafer, on a thorn, and tears off the body, leaving the wing-cases, wings, and head. Colonel Montagu kept a young brood of this species for some time ; but though they lived in amity for about two months, they then became very pugnacious, and two out of four were killed.

L. frontatus, Lath. (*Falcunculus*, Vieill.) Head and neck black, crested, with two lateral white bands ; wings and tail brown ; body beneath yellow. About 7 inches long. Inhabits New Holland.—*Shaw*, xiii. pl. 50.

L. Antiguanus, Lin. Plumage reddish yellow ; wing-feathers and cuneated tail black ; bill large, with hooked tip. 7 inches long. Inhabits Philippine Islands.—*Shaw*, vii. 333.

L. collaris, Lin. Collared Shrike. Plumage black above, white beneath ; white scapulars, and cuneated tail edged with white ; bill and legs black. 10 inches long. Inhabits Africa.

This species, according to Levaillant, when it sees a locust, a mantis, or a small bird, springs on it, and instantly carries it off, to impale it on a thorn, and with such dexterity that the spine always passes through the head of the victim ; or, if a thorn cannot readily be found, it fixes, with great address, the head of the captured animal between a division of two small branches. Every creature which it seizes undergoes exactly the same process, and it thus continues to kill, and to store up its bloody acquisitions all day long, transfixing many more carcasses than it ultimately devours.

Gen. 9. PSARIS, Cuv. Tem.—*Lanius*, Lin.

Bill thick, short, hard, conical, round, ridged, depressed at the base, compressed at the point, which is crooked and notched ; no nasal furrow ; nostrils distant from the base, lateral, round, open, in the corneous substance of the bill ; legs strong ; tarsus short, the length of the intermediate toe ; the external toe united to the first joint, the internal at the base ; wings of medium size, the third and fourth feathers longest.

P. Cayanus, Tem. Plumage bluish gray ; head, borders of the wings, quill-feathers, and tail black ; bill reddish, with black tip ; legs black. 8 inches long. Inhabits Cayenne.—*Buff. Pl. Enl.* 377.

P. Cuvierii, Swainson. Plumage yellowish olive above ; lower part of the neck, breast, sides, and inner wing-coverts yellow ; abdomen white ; crown of the head deep bluish black ; bill bluish ; tail short, slightly divaricated. $5\frac{1}{2}$ inches long. Inhabits Brazil.—*Swainson, Zool. Illust.* pl. 32.

Gen. 10. SPARACTES, Illig.—*Lanius*, Lin.

Bill strong, thick, a little depressed at the base, much dilated on the sides, without projecting ridge, a little bent and compressed at the point, which is slightly notched ; no distinct nasal furrow ; lower mandible strong, broad, with obtuse point ; nostrils basal, lateral, pierced in a furrow in the corneous mass ; legs strong ; tarsus longer than the middle toe.

S. superbus, Illig. Plumage above fine black; throat with a scarlet spot, tinged at its extremity with yellow; a yellow band across the abdomen, with reddish streaks; quill-feathers slightly edged with white; rump greenish yellow; bill strong, gray, with an upright crest of long narrow feathers; legs black. Size of a Thrush. Inhabits South Sea Islands.—*Shaw*, vii. pl. 39.

Gen. 11. *Ocypterus*, Cuv. Tem.—(*Leptopteryx*, Horsfield.)

Bill slightly depressed at the base, compressed and notched at the point; upper mandible convex above, bent at the point; nostrils lateral, distant from the base, pierced in the corneous mass, concealed by the short hairs of the base; legs and toes short; wings long, the second and third feathers equal and longest.

O. viridis, Tem. (*Lanius viridis*, Lath.) Plumage dull green above, white beneath; with blackish wings and tail. 5 inches long. Inhabits Madagascar.—*Shaw*, vii. 321.

O. leucorynchos, Tem. (*Lanius*, Lath.) Plumage blackish above, beneath and rump white. 7 inches long. Inhabits Philippine Islands.—*Shaw*, vii. 323.

Gen. 12. *Tricophorus*, Tem.

Bill short, strong, conical, compressed at its point, and widened a little at its base; upper mandible bent towards the point, which is slightly notched; base of the bill with strong and long bristles; legs short; tarsus shorter than the middle toe, the external toe united to the second joint; fourth, fifth, and sixth wing-feathers longest.

T. barbatus, Tem. Plumage above green, glossed on the back with ash; tail tinged with reddish; feathers of the throat long, forming a beard, clear yellow, with the shafts yellowish; under parts ashy-green; edges of the upper mandible with long bristles or hairs, and the occiput and upper part of the neck with eight or ten bristles. 8 inches long. Inhabits Africa.—*Shaw*, xiii. pl. 29.

Gen. 13. *Edolius*, Cuv.—*Dicrurus*, Vieill.

Bill strong, depressed at the base, compressed and notched at the end, upper mandible convex, bent, and a little crooked at the point; the lower straight, turned up at the point; base furnished with long stiff hairs; nostrils basal, lateral, half covered with feathers and long hairs; legs slender, short; wings with the fourth, fifth, and sixth feathers longest; tail more or less forked.

E. forficatus, Tem. (*Lanius forficatus*, Lath.) Plumage greenish-black, with upright frontal crest and forked tail; bill and legs black. Inhabits China, Madagascar, &c.—*Buff. Pl. Enl.* 169.

E. Malabaricus, Tem. (*Lanius*, Shaw.) Plumage deep black, with

a gloss of blue on the upper parts and breast, where the feathers are lanceolate ; a large crest rising from the base of the upper mandible ; exterior tail feathers very long, with naked shaft and plumed tips. Size of the Thrush. India.—*Shaw*, xiii. pl. 47.

E. mystaceus, Tem. Plumage black, glossed with green ; wing-coverts, quills, and tail brown black ; base of the bill with elongated bristles ; tail slightly forked. Size of the Thrush. Inhabits Africa.—*Vaill. Ois. d'Afrique*. pl. 169.

Gen. 14. CEBLEPYRIS, Tem.

Bill thick, short, strong, widened at the base, a little tumid, compressed at the point ; upper mandible convex, bent and notched towards the point ; lower mandible straight, almost equal to the upper ; nostrils basal, lateral, ovoid, concealed by close-set hairs ; legs short, weak ; lateral toes unequal, united at the base ; fourth and fifth wing-feathers the longest.

C. Papuensis, Tem. (*Graculus*, Cuv. *Corvus*, Lath.) Plumage brownish gray above, with white abdomen ; quill-feathers blackish brown ; eye-streak black. 11 inches long. Inhabits New Guinea.—*Lath. Ind.* 157.

C. canus, Tem. (*Muscicapa*, Lath.) Plumage ash-coloured above, darker beneath, with the tail-feathers black, the two exterior tipped with ash-colour, and the quill-feathers white on their inner webs. $8\frac{1}{2}$ inches long. Madagascar.—*Buff. Pl. Enl.* 541.

C. Vaillantii, Tem. (*Echenilleur gris*, Vaill.) Plumage above slaty-gray, beneath paler ; before and behind the eyes and the breast dusky ; quill-feathers brownish, margined externally with white ; tail doubly wedged. Size of a Lark. Inhabits Africa.—*Vaill. Ois. d'Afrique*. pl. 162, 163.

C. niger, Tem. Plumage above black, glossed with blue or green ; beneath, and with the quill-feathers within olive green. Size of the preceding. Inhabits Africa.—*Vaill. Ois. d'Afrique*. pl. 165.

Gen. 15. CORACINA, Vieill.

Bill thick, strong, angular, convex above, straight, narrowed at its point, which is compressed, and feebly notched or smooth, with short hairs at the base ; nostrils basal, rounded, open before, shut behind by a feathered membrane ; legs strong ; tarsus shorter than the middle toe ; fourth and fifth wing feathers longest.

C. cephaloptera, Tem. (*Cephalopterus ornatus*, Geoff.) Plumage black ; crest vertical, large, glossed with violet-colour, as are also the pendant breast feathers. Size of a Jay. Inhabits Brazil.—*Shaw*, x. pl. 39.

C. calva, (*Gymnocephalus*, Geoff. *Corvus*, Lath.) Plumage ferruginous brown above, rufescent beneath ; with the face naked beyond the eyes. 13 inches long. Inhabits Cayenne.—*Shaw*, vii. 352.

C. rubricollis, Tem. (*Querula*, Vieill. *Muscicapa*, Lath.) Plumage black; chin and large spot on the throat purple. 12 inches long. Inhabits Cayenne.—*Lath. Ind.* 489.

C. nudicollis, (*Gracula fœtida*, Shaw. *Gymnoderes*, Geoff.) Plumage bluish black, the feathers in front of the head and beneath the bill resembling velvet; wing-coverts and quill-feathers blue-gray; sides of the neck naked and red. Size of the Jackdaw. Inhabits South America.—*Buff. Pl. Enl.* 609.

Gen. 16. AMPELIS, Lin.

Bill short, a little depressed, deeper than broad, trigonous at the base, notched and suddenly bent at the point; nostrils basal, lateral, rounded, half shut by a membrane; tarsus the length of or shorter than the middle toe; the lateral toes united to the second joint; the second wing-feather longest.

A. Cotinga, Lin. Purple-breasted Chatterer. Plumage splendid blue above, purple beneath; wings and tail black. $8\frac{1}{2}$ inches long. Inhabits Brazil.—*Edwards*, pl. 340.

A. hypopyrra, Vieill. Plumage above deep gray, with a shade of green on the back and the exterior margin of the tail-feathers; lighter gray below; a tuft of red orange feathers on the flanks; wing-coverts reddish. 7 inches long.—Inhabits Guiana.

A. Pompadoura, Lin. Plumage purple, with the feathers of the greater wing-coverts elongated, narrow, and pointed. $7\frac{1}{2}$ inches long. Inhabits Guiana.—*Edwards*, pl. 341.

Gen. 17. CASMARHYNCHOS, Tem.

Bill broad, much depressed, soft and flexible at the base, compressed, corneous, and notched at the point; nasal furrow large; the lower mandible thin and flexible; nostrils large, near the point of the bill, ovoid and open, furnished with small feathers; tarsus longer than the middle toe; third and fourth wing-feathers longest.

C. variegatus, Tem. (*Ampelis*, Lin.) Neck, breast, belly, back, and thighs ash-coloured; rump greenish; wing-coverts black, legs and quill-feathers dusky; fore part of the neck with a number of long black fleshy wattles. Inhabits Brazil.—*Shaw*, xiii. pl. 62.

C. carunculatus, Tem. (*Ampelis*, Lath.) Bill black, with a fleshy caruncle at its base, hanging over like that of the turkey; plumage white, with the rump, quills, and tail-feathers inclining to yellowish; forehead naked; legs black. 12 inches long. Inhabits Brazil.—*Shaw*, x. pl. 37.

Gen. 18. PROCNIAS, Illig.

Bill broader than the forehead, dilated on the sides, strong, depressed, but much compressed at the point, which is notched; ridge a little raised at the base; nostrils basal, tubular, bor-

dered by a membranous circle ; tarsus longer than the middle toe ; second and third wing-feathers longest.

P. ventralis, Tem. Blue Berry-eater. Plumage azure blue, with the forehead and jugulum black ; body beneath white in the middle ; sides with dusky transverse stripes ; female greenish. 6 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 5. fig. 1. 2.

P. cyanotropus, P. Max. Plumage above splendid azure or green, beneath white ; wings and throat black. Inhabits Brazil.—*Lath. Gen. Hist.* v. 871.

Gen. 19. RUPICOLA, Cuv.

Bill of medium size, robust, slightly arched, bent at the point and notched ; lower mandible straight, pointed ; nostrils basal, lateral, ovoid, concealed by the semicircular feathers of the tuft ; legs robust ; tarsus partly covered by feathers, and the length of the intermediate toe ; the external toe united farther than the second joint ; first wing-feather much elongated, filiform.

R. elegans, (*Pipra rupicola*, Lin.) Plumage saffron-orange ; quills partly white, partly brown ; coverts loose and fringed ; crest erect, semicircular, with purplish margin ; tail-coverts long, truncated. Size of a Pigeon. Inhabits S. America.—*Briss.* iv. t. 34, fig. 1.

R. Peruviana, Tem. (*Pipra*, Lin.) Body reddish saffron-coloured ; greater wing-coverts ash-coloured ; quills and tail black ; tail-coverts not truncated ; head crested. Rather larger than the preceding. Inhabits S. America.—*Buff. Pl. Enl.* 745.

R. viridis, Tem. (*Calyptomena*, Raffles.) Plumage shining green, with a spot on each side of the nape ; three oblique stripes on the wings, and the quills, except the outer margins, dark-coloured. Inhabits Sumatra.—*Tem. Pl. Col.* 216.

Gen. 20. PHIBALURA, Vieill.

Bill very short, a little conical, convex above, dilated on the sides ; upper mandible notched at the point, the lower straight ; nasal furrow very small, and the nostrils covered by a membrane ; first and second wing-feathers longest ; tail long, slender, much forked.

P. flavirostris, Vieill. Plumage varied with black and rufous ; crown, quills, and tail-feathers black ; occiput and throat rufous ; neck behind and breast black and white ; abdomen spotted with black and white. 8 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 118.

Gen. 21. PIPRA, Lin.

Bill trigonal, short, widened at the base, compressed and notched ; nostrils basal, lateral, open, half concealed by a feathered membrane ; wings and tail short ; two exterior toes united at about half their length ; third and fourth wing-feathers longest.

- P. pareola*, Lin. Blue-backed Manakin. Head with a crest of bright crimson feathers ; back and lower wing-coverts blue ; body black. $4\frac{1}{2}$ inches long. Inhabits S. America.—*Desm. Man.* pl. 50-53.
- P. caudata*, Lath. Long-tailed Manakin. Body blue ; crest crimson-coloured ; wings black, with the two middle tail-feathers elongated and acuminate. Size of the preceding.—*Shaw*, x. 15.
- P. strigilata*, Tem. Back and wings green ; quills brown, edged with white on their inner webs ; throat ashy green ; body beneath yellowish-white, striated with brown ; male with a red crest.—*Tem. Pl. Col.* 54, fig. 1, 2.
- P. Manacus*, Lin. Plumage above black, beneath white, with a spot on the neck and wings white. Four inches long. Inhabits Brazil.—*Desm. Man.* pl. 58.

Gen. 22. PARDALOTUS, Vieill.

Bill very short, thick, dilated at the base, with distinct ridge ; both mandibles equally strong, and of the same length, convex and a little obtuse, the upper one notched ; nostrils basal, lateral, covered by a membrane ; legs slender ; tarsus longer than the middle toe.

- P. punctatus*, Tem. (*Pipra*, Lin.) Gray Manakin. Plumage gray, waved with brown ; crown and wings black, spotted with white ; tail-coverts red. Inhabits New Holland.—*Shaw, Nat. Mis.* 111.
- P. striatus*, Tem. Gray-brown Manakin. Plumage gray brown above, yellowish beneath ; top of the head black, with white stripes ; a deep yellow spot between the bill and the eye ; secondary quills yellow at the tips. $4\frac{1}{2}$ inches long. Inhabits Van Dieman's Land.—*Shaw*, x. pl. 4.
- P. superciliosus*, Tem. Plumage chestnut red above, beneath yellowish ; supercilia whitish above, margined with black ; quills spotted with white. Inhabits New Holland.—*Shaw*, x. 34.

Gen. 23. TODUS, Lin.

Bill long, formed of two thin plates, broader than deep, with a distinct ridge ; point of the upper mandible straight, divided at the extremity, the lower obtuse and truncated ; nostrils open and rounded ; base of the mandibles with long hairs ; toes lateral, unequal ; the external united to the third joint, the internal to the second, wings short, with the fourth quill the longest.

- T. viridis*, Lin. Plumage green above, breast red, white below, throat red. $3\frac{1}{2}$ inches long. N. America.—*Shaw*, viii. pl. 16.

Gen. 24. PLATYRHYNCHOS, Desm.

Bill broader than the face, dilated on the sides, much depressed, with the point bent and notched ; nostrils round, open, closed above by a feathered membrane ; tarsus longer than the mid-

dle toe ; the exterior toe united to the middle one to the first joint ; nail of the hind toe hooked, strong ; third and fourth wing-feathers longest.

P. Pitangua, Tem. (*Tyrannus*, Cuv.) Plumage ferruginous brown above ; yellowish beneath, with a yellow band on each side of the head, and strong fulvous bill. Size of a blackbird. Inhabits Brazil.—*Shaw*, vii. 300.

P. olivaceus, Tem. Plumage olive-green, with the throat, neck in front, and breast greenish ; abdomen ashy-yellow ; wings and tail brown, glossed with greenish. 5 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 12. fig. 1.

P. cancomus, Tem. With a yellow crest ; forehead and eyebrows olive brown ; a white spot on the lores ; throat white ; body above, breast, and middle of the abdomen brown. $3\frac{1}{2}$ inches long. Inhabits Brazil.—*Tem. Pl. Col.* 12. fig. 2.

Gen. 25. MUSCIPETA, Cuv. Tem.

Bill much depressed, broader than deep ; upper mandible with a sharp ridge, hooked, and incurved on the lower, and generally notched ; lower mandible much depressed, pointed, the base furnished with long hairs, which frequently project beyond the bill ; nostrils basal and open ; lateral toes unequal ; the external one united to the second joint ; first three quill-feathers graduated, the fourth or fifth the longest.

M. plumbea, Tem. (*Todus plumbeus*, Lath.) Plumage above hoary lead-colour, inclining to black on the crown ; beneath milk-white ; wings and tail blackish. Size of the Wren. Inhabits Surinam.—*Lath. Ind.* 267.

M. regia, Tem. (*Todus regius*, Lath.) Plumage brown above, whitish, with brown undulations, beneath ; crest ferruginous, and tipped with black ; chin and eyelids white ; bill dusky-brown ; legs flesh-coloured. 7 inches long. Cayenne.—*Shaw*, viii. pl. 14, 15.

M. paradisea, Tem. Crest on the head bluish-green, body white, tail wedge-shaped, with the two middle feathers very long in the male, but considerably shorter in the female. About six inches in length, and the tail fourteen. Inhabits Africa.—*Edw. Glean.* pl. 113.

M. flavigastra, Tem. Plumage above ash-coloured, yellow beneath, with the quills and tail dusky black ; legs dirty flesh-colour. Inhabits New South Wales.—*Shaw*, x. 343.

Gen. 26. MUSCICAPA, Lin.

Bill strong, angular, depressed at the base, compressed towards the point, which is curved, and much notched ; base furnished with long and stiff hairs ; nostrils basal, lateral, ovoid, partly covered by hairs ; tarsus as long as the middle toe ; lateral toes almost always equal.

This is a numerous genus and very widely dispersed, being found in almost all latitudes.

- M. grisola*, Lin. Spotted Fly-catcher. Plumage brownish above, whitish beneath; neck longitudinally spotted; sides under the wings tinged with dull orange; legs short and black. About six inches long.—*Selby, Illust. pl. 43,* fig. 1.*
- M. albicollis*, Tem. (*M. collaris*, Bechst.) The Pied Fly-catcher. Top of the head, cheeks, back, small coverts of the wings, and all the tail-feathers deep black; forehead, a broad collar round the neck, and lower parts pure white; large coverts of the wings white, terminated by black on the interior webs. 5 inches long. Inhabits Europe.—*Shaw, x. pl. 30.*
- M. luctuosa*, Tem. (*M. atricapilla*, Gmel.) Upper parts of the body and the tail-feathers deep black; forehead and lower parts pure white; wings brownish black, the middle and greater coverts white. 5 inches long. Inhabits Europe. B.—*Selby, Illust. pl. 43*, fig. 2, 3.*
- M. parva*, Bechst. Upper parts of the body reddish ash-coloured, which takes a slight bluish tint above the ears; feathers of the wings brown ash-coloured; four middle feathers of the tail and the extremities of the lateral ones blackish; throat and breast bright red, the lower parts whitish; bill and legs brown; hairs at the base of the bill very long. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man. 158.*
- M. cæsia*, Tem. Plumage of the male bluish, with the quills ashy-brown; tail-feather dusky ash; female with the head, neck, and back yellowish brown; throat whitish; belly and vent red; wings and tail brown. 6 inches long. Inhabits Brazil.—*Tem. Pl. Col. 17.*
- M. miniata*, Tem. Top of the head and back of a fine polished steel black; lower part of the back, middle of the quills and lateral tail-feathers externally of a vermilion colour; the male with a black throat. 7 inches long. Inhabits Java.—*Tem. Pl. Col. 155.*
- M. flammea*, Lath. Plumage black, with the back, lesser wing-coverts, breast, vent, edges of the secondary quills, and tips of the tail-feathers orange-coloured. 6 inches long. Inhabits India.—*Tem. Pl. Col. 263, fig. 1, 2.*

Gen. 27. MALURUS, Vieill.—*Sylvia*, Lath.

- Bill slender, deeper than broad; the upper mandible scarcely arched, base with small stiff hairs; nostrils basal, lateral; tarsi slender; exterior toes united to the second joint; wings very short, rounded; tail very long, slender.
- M. Africanus*, Tem. Plumage above black, with the edges of the feathers red gray; beneath reddish white; crown of the head red, spotted with dusky; a longitudinal black stripe on each side of the throat; tail-feathers brown, edged with red. 7 inches long. Inhabits Cape of Good Hope.—*Swainson, Zool. Illust. pl. 170.*
- M. marginalis*, Tem. Plumage brown above, with the edges of the feathers paler or reddish; under parts, throat, and eyebrows white;

breast and abdomen spotted with brown ; tail very long and wedged. Inhabits Java.—*Tem. Pl. Col.* 65, fig. 2.

M. longicaudus, Tem. Plumage olive, with the crown reddish ; quills olive brown ; tail-feathers long and narrow, the middle ones very long. Inhabits China.—*Shaw*, x. 756.

Gen. 28. SYLVIA, Lath. Temm.

Bill straight, slender, awl-shaped, the base deeper than broad ; point of the upper mandible frequently notched, the under one straight ; nostrils basal, lateral, ovoid, partly covered by a membrane ; tarsus longer than the middle toe ; the exterior toe joined at its base to the middle one ; first quill-feather very short, or none ; second scarcely exceeding the third ; great wing-coverts much shorter than the quill-feathers.

This group comprises most of the small singing birds of Europe. The plumage of the species is plain and uniform in colour ; and in general the males differ but slightly in this respect from the females. M. Temminck divides the genus into two sections, the first containing such as inhabit the margins of waters and marshes, and hence called Aquatic Warblers ; the second those which in summer visit our woods for the purpose of incubation, and which he terms Sylvan Warblers. Most of them possess much sweetness and variety of note. Except the Redbreast and Dartford Warbler, all are in Britain periodical visitors.

1. AQUATIC WARBLERS.—*Summit of the head depressed ; wings short, much rounded ; tail long, graduated, often conical.*

S. turdoides, Meyer, Tem. (*Turdus arundinaceus*, Lin.) The Reed Warbler. Plumage ferruginous brown above, yellowish white beneath ; a yellowish white line above the eyes ; bill yellow at its base, brown towards the point ; tail rounded. 8 inches long. Inhabits Europe.—*Buff. Pl. Enl.* 513.

S. galactotes, Tem. Plumage above of a bright red ; lateral tail-feathers with a deep black spot towards the end, and the extremity pure white ; wings of a clear brown, bordered with reddish ; a brown band from the bill to the eye ; under parts white, shading to reddish. $6\frac{1}{2}$ inches long. Inhabits Spain.—*Tem. Man.* 182.

S. fluviatilis, Meyer. Danubian Warbler. Upper mandible and points of the bill brown ; plumage olive-coloured above ; throat white, with longitudinal spots of olive ; abdomen white ; legs flesh-coloured. 5 inches long. Inhabits Germany.—*Tem. Man.* 183.

S. locustella, Lath. Grasshopper Warbler. Bill awl-shaped ; plumage above olive, shaded with brown and brownish-black spots ; throat white, with under it a zone of oval brown spots ; tail long and graduated, the coverts reddish yellow, with brown spots ; posterior claw shorter than the toe. 5 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 45, ** fig. 1.

S. certhiola, Tem. Bill strong ; upper mandible black ; plumage above olive, with brown spots ; throat, neck before, and abdomen white ; tail-feathers with a large ash-coloured spot below ; posterior claw bent, longer than the toe. 5 inches long. Inhabits Southern Russia.—*Tem. Man.* 186.

- S. aquatica*, Lath. Bog-rush Warbler. Plumage above brown ; with a band of yellowish white above the eyes, and another broader one from the base of the bill to the middle of the head, the spaces between them brown black ; scapulars and centre of the back gray, with longitudinal blackish spots ; tail-feathers acuminate, and the tail rounded. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 188.
- S. phragmitis*, Bechst. Sedge Warbler. Top of the head, back, and scapulars olive-gray ; a broad band of yellowish white above the eyes ; under parts of the body whitish yellow, tinted with reddish ; tail brown ash-coloured, slightly rounded. 4 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 45**, fig. 2.
- S. arundinacea*, Lath. Reed Warbler. Bill compressed at the base ; plumage generally oil-green, tinged with reddish ; throat, breast, and belly yellowish white ; tail cuneated, rather long ; hind toe strong. 5 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 45**, fig. 3.
- S. palustris*, Bechst. Marsh Warbler. Bill broader than deep at the base ; plumage above olive brown, the wings margined with cinereous ; a narrow yellowish white stripe above the eyes ; under parts yellowish white. 5 inches long. Europe.—*Tem. Man.* 192.
- S. Cetti*, Marmora. Plumage above deep brown, slightly shaded with red ; feathers of the wings and tail blackish brown ; between the bill and eyes an ash-coloured line ; throat white ; sides, flanks, and thighs brown ; tail broad, with rounded feathers. 5 inches long. Inhabits Sardinia.—*Tem. Man.* 194.
2. SYLVAN WARBLERS.—*Tail square, or slightly forked at the end.*
- S. luscinia*, Lath. Tem. (*Motacilla luscinia*, Lin.) The Nightingale. Plumage reddish brown above, cinereous white beneath ; tail brownish-red ; third and fifth wing-feathers of equal length. 6 inches long. Inhabits Europe, migrating in winter to Egypt and Syria.—*Selby, Illust.* pl. 46, fig. 1.

The Nightingale, so justly celebrated for the sweetness and power of its song, arrives in Britain towards the end of April or beginning of May. The males precede the females by an interval of ten days or a fortnight. The nightingale excels all birds in the softness and mellowness, as well as in the duration, of its song. Though heard to most advantage in the stillness of a fine evening, it also sings in the day-time, but its tones are then blended with those of other birds, and consequently not so readily distinguished. The Honourable Daines Barrington, who kept a very fine nightingale for three years, and bestowed particular attention on its musical faculties and exertions, ascertained that the sound of its song filled the circle of an English mile in diameter. The nightingale may be domesticated, though not without considerable pains and difficulty. For this purpose it must be treated with tenderness, and with favourite food, as the nymphæ of ants, meal-worms, and certain pastes, prepared by the dealers. In consequence of careful management, its warble is rendered much superior to that of the wild nightingale, and is continued all the year round, except during moulting.

- S. philomela*, Bechst. Plumage above grayish brown ; on the breast clear gray, shaded with deeper colour ; throat whitish ; second and third wing-feathers of nearly equal length. $6\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 196.

- S. sericea*, Natterer. Plumage above gray brown, with the sides of the neck and breast ash-coloured, shaded on the flanks to gray brown; a line around the eyes, throat, and middle of the belly white; the fourth, fifth, and sixth wing-feathers longest. $5\frac{1}{4}$ inches long. Inhabits Spain.—*Tem. Man.* 197.
- S. Orpheu*, Tem. Head and cheeks blackish; upper parts of the body ash-coloured; wings bordered with brownish; the exterior feathers on each side of the tail white, the others blackish, terminated with white; abdomen and lower tail-coverts red; upper mandible notched, the base of the under one yellowish. 6 inches long. Inhabits Europe.—*Tem. Man.* 198.
- S. nisoria*, Bechst. Head, neck, cheeks, and body above deep ash-coloured, with the feathers terminated by a brown and white line; sides waved with griseous; abdomen whitish; bill brown; iris yellow. $6\frac{1}{2}$ inches long. Northern Europe.—*Tem. Man.* 200.
- S. atricapilla*, Lath. Black-cap Warbler. Orbits of the eyes covered with feathers; head of a deep black in the male, in the female red; upper parts of the body ash-coloured; belly and throat whitish; bill and legs black. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 46, fig. 2 and 3.
- S. melanocephala*, Lath. Plumage gray above, wings and tail blackish; white below; orbits naked; male with the head black; female ash-coloured, blackish; bill thick and strong, the base of the lower mandible white. 5 inches long. Europe.—*Tem. Man.* 203.
- S. Sarda*, Marmora. Plumage cinereous above, below whitish; orbits naked; male blackish ash-coloured on the throat; wings and tail blackish; bill short and slender. 5 inches long. Inhabits Sardinia.—*Tem. Pl. Col.* 24, fig. 2.
- S. hortensis*, Bechst. Garden Warbler. Plumage above gray brown, lightly tinted with olive, white around the eyes; throat whitish; breast and flanks reddish gray; belly white; base of the lower mandible yellowish. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 46, fig. 4.
- S. cinerea*, Lath. The White-Throat. Plumage above yellowish brown, tinged with gray; throat and middle of the belly white; breast slightly tinged with rose-red; quills blackish brown; tail brown, the exterior feather having its end and anterior web white, and being shorter than the rest. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 46, fig. 6.
- S. curruca*, Lath. Plumage above brown, whitish below, with the tail-feathers blackish; the exterior one with the outer web white. 5 inches long. Inhabits Europe.—*Tem. Man.* 209.
- S. conspicillata*, Marmora. Top of the head and cheeks pure ash-colour; space between the bill and eye black; region of the eyes white, surrounded with black; back rufous; throat white; wing-coverts bordered with red; tail rounded, blackish, the exterior feather almost white. 4 inches long. Inhabits Southern Europe.—*Tem. Pl. Col.* 6, fig. 1.

- S. provincialis*, Gmel. Dartford Warbler. All the upper parts, with the exception of the tail, fine deep gray; throat and flanks reddish purple or wine-coloured; belly white; wing-feathers black on their interior webs, very short. 5 inches long. Inhabits Europe. B.—*Selby, Illust. pl. 46, fig. 6.*
- S. passerina*, Lath. Top of the head, cheeks, and neck, clear ash-colour; upper parts of the body olive, with the coverts fringed with reddish; front of the neck, breast, and flanks red; throat and centre of belly white; tail-feathers, except the middle four, tipped with white. $4\frac{1}{2}$ inches long. South of Europe.—*Tem. Man. 213.*
- S. subalpini*, Bonelli. Plumage above ash-coloured; below vinous-red, with the centre of the belly white; tail nearly black, slightly rounded. $4\frac{1}{2}$ inches long.—*Tem. Man. 214.*
- S. rubecula*, Lath. The Redbreast Warbler. Plumage above of a gray olive-brown; forehead, space between the eye and the bill, front of the neck and breast, lively red, margined with smoke gray; belly white. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust. pl. 46, fig. 2.*
- The Redbreast is a solitary bird, and is never found associating in numbers together, even during its partial migrations. It is widely diffused, being found through the greater part of Europe; and its general familiarity and confiding manners have attracted peculiar notice. In Britain the popular ballad of the *Babes in the Wood* has tended to protect the redbreast's nest; and its premature approach to houses in autumn is held the precursor of an early winter. The redbreast feeds on worms and insects, makes its nest in mossy banks or shady thickets, and lays from five to seven eggs, of a pale yellowish gray, with pale reddish-brown spots. The redbreast's notes are heard among the latest in the evening, and it commences its warble in the morning sooner than most other birds.
- S. succica*, Lath. Tem. (*Motacilla Succica*, Lin.) Blue-throated Warbler. Plumage above rust-coloured; breast striped with blue; tail-feathers brown, and black towards the base. $5\frac{1}{2}$ inches long. Inhabits Northern Europe.—*Tem. Man. 217.*
- S. lithys*, Scopoli. The Red-tail Warbler. Plumage above bluish ash-colour; space between the bill and eye, cheeks, throat, and breast deep black, shading to bluish-ash on the belly, and blue on the flanks; lower coverts of the tail, rump, and tail-feathers red; large coverts of the wings bordered with white. 5 inches long. Inhabits Northern Europe.—*Tem. Man. 218.*
- S. phoenicurus*, Lath. Tem. (*Motacilla*, Lin.) Red-start Warbler. Forehead and eyebrows pure white; a band at the base of the bill, space between that and the eye, throat, and neck black; under parts of the body orange-red. 5 inches long. Inhabits Europe. B.—*Selby, Illust. pl. 46, fig. 3.*
- S. Hippolais*, Lath. Lesser Petty-chaps. Plumage greenish-ash above, primrose yellow beneath; eyebrows white. Inhabits Europe. B.—*Selby, Illust. pl. 47, fig. 1.*
- S. sibilatrix*, Bechst. Wood Wren. Top of the head and upper parts sulphur yellow; forehead and eye-streak yellowish; under parts white; tail slightly forked, brownish. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust. pl. 47, fig. 2.*

- S. trochilus*, Lath. The Yellow Wren. Upper parts of the body olive-green, tinged with gray; lesser wing-coverts and margins of quill-feathers pale yellow; lower parts of the body yellow, with centre of the belly white. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 224.
- S. rufa*, Lath. Top of the head and upper parts grayish brown, shaded with olive; throat white, eye-streak yellowish, wings and tail brown; coverts of the wings yellow. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 226.
- S. Nattereri*, Tem. Top of the head and neck brown ash-coloured, shading to brown olive on the back and wing-coverts; eyebrows pure white; tail and wing-feathers blackish cinereous, with the margins greenish. 4 inches long. Inhabits Southern Europe.—*Tem. Pl. Col.* 24, fig. 3.
- S. cisticola*, Tem. Top of the head, neck, back, and coverts of the wings brownish ash-coloured; with the middle of the feathers blackish brown, producing large longitudinal spots; extremity of the lateral feathers with a deep black spot; under parts reddish white; tail short, graduated. 4 inches long. Inhabits Southern Europe.—*Tem. Man.* 228.
- S. cyanocephala*, Tem. Plumage above green, with the head and greater wing-coverts blue; throat hoary; quills brown, edged with green. 5 inches long. Inhabits Cayenne.—*Shaw*, x. 634.
- S. Africana*, Lath. African Warbler. Plumage above black, with the edges of the feathers red-gray; beneath reddish white; throat with a longitudinal black stripe on each side; tail-feathers brown, edged with red. 7 inches long. Inhabits Africa.—*Shaw*, x. 615.
- S. coronata*, Lath. Plumage varied with black and gray above, beneath white; crown, rump, and sides yellowish; a black stripe on the eyes; wings and tail dusky. N. America.—*Shaw*, x. 636.

Gen. 29. REGULUS, Cuv.—*Sylvia*, Tem. Lath.

Bill straight, slender, deeper than broad, compressed, the edges bending inwards; nostrils basal, with bristles directed forwards; wings with the first quill short, the second shorter than the third, which is the longest; tarsus longer than the middle toe.

- R. auricapillus*, Selby. (*Motacilla regulus*, Lin.) The Gold-crested Wren, Penn. Plumage above olive, tinted with yellowish; crest of elongated silky feathers of a rich orange-colour; a black stripe on each side of the head; bill black, awl-shaped; lower parts yellowish gray. $3\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 47, fig. 4.
- R. ignicapillus*, Tem. Plumage above olive-green, shading to yellowish: three longitudinal bands on the cheeks, two white and one black; crest of the male lively orange. $3\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 231.

R. calendulus, Vieill. (*Motacilla*, Lin.) Plumage brownish-green above, with a ruby-red stripe on the crown; body and wings beneath yellowish. $4\frac{1}{2}$ inches long. Inhabits North America.—*Edw. Glean.* pl. 254, fig. 2.

Gen. 30. TROGLODYTES, Cuv.—*Sylvia*, Lath.

Bill slender, slightly compressed, curved, emarginated; nostrils basal, half covered by a naked membrane; wings short and rounded; fourth and fifth feathers of equal length, and longest; tail short, rounded, erect; tarsus the length of the middle toe.

The birds of this genus have the bill very slender and slightly bent. Their tail and wings are short, and they carry the former always erect. Their plumage is sombre, and they are of retired habits. The Common Wren is the only European species.

T. Europæus, Cuv. (*Sylvia Troglodytes*, Lath.) The Wren. Upper parts of the body pale chestnut-brown, with very narrow transverse stripes of a deeper colour; quill-feathers with alternate spots of black and reddish; throat and breast bluish-white; a narrow white band above the eye; under parts pale brown. $3\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 47, fig. 5.

T. fulvus, Vieill. (*Sylvia fulva*, Lath.) Plumage brown, inclining to yellowish below, and white on the middle of the belly; back, wings, and tail finely striped with black; feet yellowish. 4 inches long. Inhabits Surinam.—*Shaw*, x. 726.

Gen. 31. SAXICOLA, Bechst.—*Sylvia*, Lath.—*Motacilla*, Lin.

Bill straight, slender, slightly carinated, and advancing upon the forehead; the top of the upper mandible a little bent and emarginated; nostrils basal, lateral, ovoid, partly concealed by a membrane; tarsus considerably longer than the middle toe; the outer toe joined at its base to the middle one; third and fourth quill-feathers longest.

The greater number of the individuals of this genus live in open and rocky situations. They are never found in large woods, and rarely in bushes. Their food is insects, which they seize on the ground, running with celerity. They are generally distinguished by the distribution of black and white on their caudal feathers, in which the white occupies the greater part, the extremity and two middle feathers being black. Their tail is constantly in motion.

S. cachinnans, Tem. (*Turdus leucurus*, Gmel.) Plumage above deep black; rump, thighs, and tail from the base near to the tip white; two middle tail-feathers black to near their origin. 7 inches long. Inhabits Southern Europe.—*Shaw*, x. pl. 22.

S. ænanthe, Bechst. (*Sylvia*, Lath.) The Wheat-ear. Plumage above bluish-gray; a black band passes each eye and covers the orifices of the ears; forehead, chin, eyebrows, rump, and belly white; tail white two thirds of its length. 6 inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 48, fig. 1.

S. stapazina, Tem. Space between the eye and bill, round the eyes, all the throat, scapulars, and wings, deep black; top of the head,

rump, and lower parts white ; neck and back slightly tinted with reddish ; tail white, tipped with black, except the exterior feathers, which are mostly black, and the two middle totally so. $5\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Edw.* pl. 31.

S. aurita, Tem. Space between the eye and bill, region of the eyes and ears, and the wings deep black ; fore part of the neck, lower parts of the body, head, and rump white ; top of the back and neck tinged with reddish ; tail white three-fourths of its length, black at the end, except the exterior feathers, which are chiefly blackish, and the middle ones totally so. $5\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 241.

S. leucomela, Tem. (*Motacilla*, Pall.) Sides of the head, throat, and fore part of the neck deep black ; occiput and nape white ; back and wings brownish black ; belly white ; tail white two-thirds of its length, the remainder and two middle feathers black. $5\frac{1}{2}$ inches long. Inhabits Northern Europe.—*Tem. Man.* 243.

S. rubetra, Bechst. The Whin-Chat. Top of the head and upper parts of the body blackish brown ; each feather bordered with reddish and yellow ; a broad white band above the eyes ; longitudinal stripe on each side of the neck white ; breast rose-coloured ; a large spot of white on the wings and tail, the two middle feathers of which are dusky. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 48. fig. 2.

S. rubicola, Bechst. The Stone-Chat. Head and throat black ; sides of the neck, upper parts of the wings, and rump white ; breast orange brown ; back black, the feathers edged with whitish red ; lower parts of the body reddish white. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 48. fig. 3, 4.

S. sperata, Tem. Plumage above greenish brown ; under parts and rump reddish gray ; two middle tail-feathers dusky, the outer ones obliquely half brown and fulvous. 6 inches long. Inhabits Southern Africa.—*Shaw*, x. 708.

S. melanura, Tem. Plumage above dull ash-colour, beneath paler ; wings brownish ; tail rounded and black. $5\frac{1}{2}$ inches long. Inhabits Arabia.—*Tem. Pl. Col.* 257, fig. 2.

Gen. 32. ACCENTOR, Bechst.—*Motacilla*, Lin.

Bill strong, of medium length, straight, and drawn to a fine point ; edges of the mandibles compressed, the upper one emarginated ; nostrils basal, naked, pierced in a large membrane ; legs strong, the exterior toe united at its base to the middle one ; the third quill-feather longest.

The birds of this genus inhabit the elevated regions of the Alps and other mountains, descending in winter to the plains and valleys. They feed on insects and seeds. The nest of the British species is frequently selected by the Cuckoo as the depository for its eggs.

A. alpinus, Bechst. Head, breast, neck, and back gray ash-colour, with large brown spots on the back ; throat white, with brown

scales; belly and flanks reddish, mixed with white and gray; wings and tail blackish brown; legs yellowish. $6\frac{1}{2}$ inches long. Inhabits mountains in Europe.—*Tem. Man.* 248.

A. modularis, Cuv. Hedge Accentor. Top of the head ash-coloured, with brown spots; sides of the neck, throat, and breast with a bluish tinge; large reddish brown spots on the centre of the feathers of the back and wing-coverts; belly white; lower coverts of the tail brown, with a white border. 5 inches long.—*Selby, Illust.* pl. 43*, fig. 4.

A. montanellus, Tem. Plumage red brown, longitudinally striped with red; head and occiput black, with a black band below the eyes; two rows of little yellowish points forming a double band on the wings; lower parts yellow. 5 inches long. Inhabits Southern Europe.—*Tem. Man.* 251.

A. Calliope, Tem. Plumage above rusty brown, beneath yellowish white; throat vermilion, bordered with black and white; spot between the bill and eyes black; eyebrows white. 6 inches long. Inhabits Siberia.—*Shaw*, x. 644.

Gen. 33. MOTACILLA, Lath.

Bill slender, straight, subulate, angular between the nostrils; edges of the lower mandible compressed; nostrils basal, lateral, oval, partly concealed by a naked membrane; tarsus considerably longer than the middle toe; exterior toe joined to the middle one at the base; hind claw strong and sometimes long; tail very long, equal, horizontal; one of the larger coverts as long as the wing-feathers.

The members of this well-marked genus haunt the banks of rivulets, the margins of rivers, and meadows in the neighbourhood of water. They run with great agility, and their food is insects taken both on the wing and on the ground, worms, larvæ, &c. They are subject to a double moult. The lengthened tail of the bird of this genus is kept continually in motion. They are confined to the Old Continent.

M. lugubris, Pallas. Deep black on the upper parts of the body, and eight middle feathers of the tail; forehead, around the eyes and ears, belly, and two lateral tail-feathers, white; flanks and wings ash-coloured, the coverts bordered with white. 7 inches long. Inhabits Southern Europe.—*Tem. Man.* 253.

M. alba, Lin. The Pied Wagtail. Forehead, cheeks, sides of the neck, belly, and vent, white; crown of the head, nape of the neck, throat, breast, upper parts of the body, and middle tail-feathers black; coverts of the wings bordered with white; two outer tail-feathers white. 7 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 49, fig. 1.

M. boarula, Lin. Gray Wagtail. Plumage above bluish gray; rump sulphur yellow; a white streak above the eyes; throat black; under parts gamboge-yellow; tail four inches long, with the exterior feather entirely white, the middle feathers black. 7 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 49, fig. 2.

M. citreola, Pall. Yellow-headed Wagtail. Top of the head, cheeks, and lower parts citron yellow; a black crescent-shaped band on the occiput; body above gray blue; wings and tail blackish, bordered with white, the lateral feathers white; posterior claw longer than the toe. 7 inches long. Siberia.—*Tem. Man.* 259.

M. flava, Lin. Yellow Wagtail. Head, nape of the neck, and ear-coverts pale yellow, with the back, rump, and scapulars a shade darker; a yellow streak over the eyes; wings and coverts blackish brown, margined with white; middle tail-feathers margined with yellow, the outer ones white. 6 inches long. Inhabits Southern Europe. B.—*Selby, Illust.* pl. 49, fig. 3.

Gen. 34. ENICURUS, Tem.

Bill elongated, broad at the base; suddenly compressed towards the tip, attenuated; tip curved; nostrils in a groove with an elevated membrane; tarsi slender; hinder claw robust, short; tail forked.

E. coronatus, Tem. (*Motacilla speciosa*, Horsf.) Plumage dark-coloured, with the pileus crested; the belly, rump, bar on the wings, outer tail-feathers entirely, and tips of the rest, snow white; tail very long. Body $4\frac{1}{2}$ inches long; tail 6 inches. Inhabits Java.—*Shaw*, xiii. pl. 58.

E. velatus, Tem. Slaty black above, white beneath; chin and neck in front black; a white frontal band; tail black, exterior feathers and tips of middle ones white. Java.—*Tem. Pl. Col.* 160.

Gen. 35. ANTHUS, Bechst. Tem. Vieill.

Bill straight, slender, cylindrical, subulate near the tip, edges inflected towards the middle; base of the upper mandible ridged, point slightly notched; nostrils basal, lateral, half-closed by an arched membrane; hind claw generally longer than the toe; third and fourth quills the longest.

A. Richardi, Vieill. Plumage olive brown, varied with whitish and black above, whitish beneath; breast reddish, spotted with black; outer tail-feathers margined with white; legs and hinder claw very long. $6\frac{1}{2}$ inches long. Europe.—*Shaw*, xiii. pl. 59.

A. aquaticus, Bechst. Shore Pipit. Plumage above olive green; a white streak above the eye; lesser and greater wing-coverts dusky; inferior parts white, varied on the breast with longitudinal streaks; two middle feathers of the tail brownish, the lateral black; hind claw curved. $6\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 49, fig. 6.

A. rufescens, Tem. Plumage above grayish yellow, with a slight tint of brown on the middle of each feather; a white band above the eyes; under parts whitish yellow; breast spotted with brown; tail blackish brown, the exterior feathers white; hind claw shorter than the toe. $6\frac{1}{2}$ inches long. Europe.—*Tem. Man.* p. 267.

- A. pratensis*, Bechst. Plumage above dark oil green, with the centre of the feathers brownish black ; under parts yellowish white, with blackish brown upon the sides of the neck and breast ; tail blackish brown, the outer feather with the exterior web and tip white ; hind claw longer than the toe. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 49, fig. 4.
- A. arboreus*, Bechst. (*Alauda*, Lin.) Tree Pipit. Plumage greenish above, with the centre of the feathers brownish black ; wing-coverts margined with yellowish white ; under parts whitish, spotted with brown ; exterior tail-feathers white ; hind claw short and curved. $5\frac{1}{2}$ inches long. Europe. B.—*Selby, Illust.* pl. 49, fig. 5.
- A. Capensis*, Tem. Plumage brown above ; throat yellow, margined with black ; eyebrows yellow ; three lateral tail-feathers white at the tips. 8 inches long. Inhabits Africa.—*Shaw*, x. 510.

ORDER IV.—GRANIVOROUS BIRDS. *Granivoræ.*

Bill more or less conical, short and strong ; ridge more or less flattened, advancing upon the forehead ; mandibles generally without notches ; three toes before and one behind, the anterior ones entirely divided ; wings of medium length.

The food of this order consists chiefly of grain and other seeds, which the strength and form of their bill enables them to free from the exterior husk ; but during the season of rearing their young, insects and larvæ form their chief support. They live in pairs, and are sedentary or migratory, according to the temperature of the countries they inhabit. In winter, or at the period of their migration, they congregate in numerous flocks. Most of the European species moult only once in the year. They are very easily tamed ; and the males during the pairing season assume a brighter and more varied plumage.

Gen. 1. *ALAUDA*, Lin.

Bill subconic, short, with the mandibles of equal length and the upper one slightly convex ; nostrils basal, lateral, partly concealed by reflected feathers ; claw of the hind toe much produced, and nearly straight ; wings with the first quill short or wanting, the third the longest ; coronal feathers generally produced, and capable of erection.

This genus inhabits open fields or plains. They feed chiefly on seeds and grains, though they occasionally take worms and insects. They make their nests on the ground, and sing during their perpendicular ascent in the air.

- A. Tartarica*, Pall. Head, neck, lower parts, and tail deep black ; feathers of the neck below, rump. and flanks black in the middle, bordered and terminated by whitish ; legs and claws black ; the hind claw longer than the toe. $7\frac{1}{2}$ inches long. Inhabits Asia.—*Tem. Man.* 275.
- A. calandra*, Lin. Plumage above reddish ash-coloured ; throat and belly white ; a black spot on each side of the neck ; lanceolate

brown spots on the breast ; quills bordered and terminated with white ; middle tail-feathers terminated by a white spot ; the lateral ones white. 7 inches long. Inhabits Europe, &c.—*Edw.* 268.

A. cristata, Lin. The Crested-Lark. Body above grayish, with narrow brown spots ; wing-feathers bordered with reddish ; middle feathers of the tail reddish, the exterior ones red at their termination ; lower parts yellowish white ; coronal tuft of elongated acuminate feathers black in the middle. $6\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 277.

A. alpestris, Lin. Plumage above reddish ash-coloured ; line above the eyes and a band on the breast black ; lateral feathers of the tail black, the exterior white on the outside ; lower parts whitish fawn-colour. $6\frac{1}{2}$ inches long. Inhabits Europe and America.—*Catesby, Car.* i. pl. 32.

A. arvensis, Lin. The Skylark. Upper parts reddish gray, each feather blackish in its middle ; a whitish band above the eyes ; throat white ; neck, breast, and flanks tinted with reddish ; tail brown, the outer feather with the tip and exterior feather white ; coronal feathers capable of erection. $6\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 50, fig. 1.

The Skylark is one of the most esteemed British song-birds. It is found throughout the whole of Europe, many parts of Asia and the north of Africa. Its song is begun early in spring and continued during the greater part of summer. It rises perpendicularly in a spiral direction, singing as it rises, till it frequently soars beyond the reach of vision. On the approach of winter larks begin to collect in immense flocks, quitting the more elevated parts of the country, and resorting to the coasts. At this period they are fat, and vast numbers are taken for the table.

A. arborea, Lin. The Woodlark. Plumage above reddish ash-coloured, with a blackish brown spot on the middle of the feathers ; a white band above the eyes and surrounding the occiput, and a triangular whitish spot on the cheeks ; under parts yellowish white ; wing-coverts terminated by white ; feathers of the head longer, and tail shorter than the skylark. 6 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 50, fig. 2.

The Woodlark is chiefly confined in Britain to the southern and western parts of England. It surpasses the skylark in the richness, though not in the variety of its notes. Its song is generally poured forth when on the wing ; but it differs from the skylark in describing widely extended circles in its flight.

A. brachydactyla, Tem. Plumage above reddish-yellow ; throat and band above the eyes white ; breast and flanks red ; abdomen white ; greater coverts of the wings as long as the quills ; toes very short ; exterior tail-feathers reddish. $5\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 284.

A. bilopha, Tem. Head double-crested ; the crests, a band on the head, the feathers at the base of the upper mandible, a broad stripe through the eyes, and a crescent at the base, black ; body above varied with red, brown, and white ; beneath whitish. $5\frac{1}{2}$ inches long. Inhabits Arabia.—*Tem. Pl. Col.* 244, fig. 1.

A. isabellina, Tem. Plumage isabella-red above, paler below ; throat

whitish ; wings and tail brown, the feathers edged with reddish. $5\frac{1}{2}$ inches long. Inhabits Arabia.—*Tem. Pl. Col.* 244, fig. 2.

Gen. 2. PARUS, Lin.

Bill short, straight, strong, conical, compressed, terminating in a point, base with small hairs ; nostrils basal, rounded, concealed by projecting feathers ; legs stout ; toes divided to their origin, nail of the hind one strongest and most bent ; wing-feathers, the first of medium length or almost deficient, the fourth and fifth the longest.

These are very small, but very lively and active birds, being constantly in motion, and possessing a great degree of strength and courage for their size. Their principal food consists of insects, though they likewise sometimes attack sickly birds. Temminck divides the genus into two sections, the first of which inhabits woods and bushes, nestling in the hollows of trees ; the second nestles among reeds, rushes, and bushes near water. Their nests are constructed with peculiar ingenuity.

* *First quill-feather of medium length.*

P. major, Lin. The Great Titmouse or Ox-eye. Plumage olive-green above, yellowish beneath ; head black ; temples white ; top of the neck yellowish ; wing-coverts grayish-blue tipped with white ; tail greenish-gray, edged with grayish-blue. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 1.

P. ater, Lin. The Cole Titmouse. Top of the head and fore part of the neck black ; a broad white band on the lateral part of the neck and a white spot on the occiput ; upper parts ash-coloured, and two white transverse bands on the wings ; belly white ; tail slightly forked. 4 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 3.

P. caeruleus, Lin. Blue Titmouse. Top of the head blue ; forehead, band above the eyes, and cheeks white ; streak before and behind the eyes black ; nape of the neck and collar azure-blue ; back grayish-blue ; wings and tail bluish, the greater coverts tipped with white ; breast and sides sulphur yellow. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 2.

P. cristatus, Lin. Crested Titmouse. Plumage reddish-gray above, white beneath ; collar black ; head furnished with a black crest, bordered with whitish. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Selby, Illust.* pl. 43, fig. 6.

P. palustris, Lin. Marsh Titmouse. Head black ; back ash-colour ; temples white ; the black on the head extending downwards on the nape ; wings brown, bordered with ash-colour ; under parts white, shaded with gray. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 4.

P. lugubris, Natt. Top of the head black, terminating at the occiput ; throat, a part before and the sides of the neck black ; back and scapulars brown ash-coloured ; temples and inferior parts white, shaded with gray-brown. 6 inches long. Inhabits Southern Europe.—*Tem. Man.* 293.

- P. Sibiricus*, Gmel. Plumage gray-brown above, whitish beneath ; abdomen reddish gray ; throat and upper part of the breast deep black ; temples and sides of the neck white ; wing and tail-feathers bordered with reddish. 5 inches long. Inhabits Northern Europe.—*Tem. Man.* 294.
- P. cyanus*, Pall. Forehead, large spot on the neck, and all the under parts snowy white ; top of the head shaded with blue ; a band of deep blue from the bill over the eyes surrounding the head and spreading upon the neck ; back, rump, and top of the wings azure-blue ; wing-coverts blue, bordered with white. $5\frac{1}{2}$ inches long. Inhabits Northern Europe.—*Tem. Man.* 295.
- P. caudatus*, Lin. Long-tailed Titmouse. Head, neck, throat, and breast pure white ; top of the back, rump, and six middle feathers of the tail deep black ; scapulars reddish ; flanks and abdomen reddish white ; quills black ; lateral tail-feathers white on their exterior webs and at the ends ; tail very long, cuneiform. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 5.
- P. atricapillus*, Lin. Body cinereous above, white beneath ; crown and throat black ; quills brown, with exterior margin grayish. $4\frac{1}{2}$ inches long. Inhabits N. America.—*Wilson, Amer. Orn.* pl. 8, fig. 4.
- ** *First quill-feather very short or wanting.*
- P. biarmicus*, Lin. (*Calanophilus*, Leach.) Bearded Titmouse. Head, neck, and breast bluish gray, the breast with a tinge of purple ; a tuft of pendant feathers between the bill and eyes ; belly and flanks yellowish brown ; under tail-coverts black ; nape of the neck and back yellowish brown, tinged with orange ; quills blackish-gray, the outer webs margined with white ; tail long and wedge-shaped. 6 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 51, fig. 6.
- P. pendulinus*, Lin. Top of the head and neck ash-coloured ; back and scapulars reddish gray ; throat white, the inferior parts whitish, with a rose tint ; wings and tail blackish, bordered with reddish white ; tail-feathers terminated with white. $4\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 300.

Gen. 3. EMBERIZA, Lin.

Bill strong, short, conical, compressed, sharp edged ; the upper mandible narrower than the under, the edges of both bent inwards ; nostrils basal, rounded, surmounted and partly covered by the feathers of the forehead ; toes divided ; the posterior with a short and bent claw ; tail forked, or slightly rounded.

The Buntings feed chiefly on farinaceous seeds, but also eat insects. Most of them live in woods and gardens, and nestle among bushes and thickets. Such of them as are furnished with a long hind toe haunt rocks and plains. The sexes are generally very different in their garb ; and some of the foreign species moult twice in the year.

• *Hind claw short and hooked.*

E. melanocephala, Scopoli. Black-headed Bunting. Top of the

head, region of the eyes and ears deep black ; back rufous ; sides of the neck and inferior parts citron yellow ; wings and tail brown, margined with whitish. $6\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 303.

E. citrinella, Lin. The Yellow Bunting. Head, neck, and upper part of the breast gamboge-yellow, varied with olive-green ; back and scapulars brownish, inclining to oil-green ; wings and wing-coverts blackish brown ; greater quills black, edged with yellow ; two lateral tail-feathers with a white spot on the inner web. 6 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 52, fig. 2, 3.

E. miliaria, Lin. Common Bunting. Upper parts yellowish brown, with the centre of the feathers darker ; lower parts yellowish white, with numerous triangular black spots ; middle of the belly white. $7\frac{1}{2}$ inches long. Europe. B.—*Selby, Illust.* pl. 52, fig. 1.

E. schæniculus, Lin. Reed Bunting. Head black, with a white streak on the sides of the neck ; under parts white ; back and wings of a fine red, with longitudinal black spots on the flanks ; tail blackish, with a conical brown spot on the exterior feathers. $5\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 52, fig. 5, 6.

E. pithyornus, Pall. Pine Bunting. Head black, with an oval white spot on the summit ; throat and upper parts bright red ; varied with longitudinal black spots on the back ; wings and tail brownish black, the two outer tail-feathers with a large conical spot of white. $6\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 310.

E. hortulana, Lin. The Ortolan. Plumage reddish gray above, paler below ; throat yellow ; tail blackish ; the two lateral feathers white at their inner web. $6\frac{1}{2}$ inches long. Inhabits Europe.—*Tem. Man.* 311.

This bird occurs in various parts of Europe, migrating in spring and autumn, when great quantities of them are caught, and fattened for the table, being proverbially celebrated for the delicacy of their flavour. That they may more speedily acquire the requisite degree of plumpness, they are shut up in a room, from which the external light is excluded, but in which are placed a few lanterns, to enable them to see to run about and pick up the millet and oats that are regularly strewed on the floor.

E. cirrus, Lin. Cirl Bunting. Throat and top of the neck black ; breast and streak above and below the eye primrose yellow ; back blackish brown, edged with grayish white ; scapulars reddish orange ; quills greenish gray ; belly and sides yellow ; lateral tail-feathers with their outer webs white. 6 inches long. Inhabits Europe.—*Selby, Illust.* pl. 52, fig. 4.

E. cia, Lin. Foolish Bunting. Plumage reddish above, with longitudinal black spots ; head ash-coloured, with blackish lines ; superciliæ white ; flanks and abdomen red. 6 inches long. Inhabits Southern Europe.—*Tem. Man.* 315.

E. lesbia, Gmel. Plumage above reddish ash-coloured, variegated with large blackish spots on the middle of the feathers ; eyebrows and ears red ; three little blackish brown bands on the sides of

the neck ; throat and parts beneath whitish, mixed with red on the breast and flanks ; tail a little forked. $4\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* pl. 317.

**** Hind claw produced, slightly bent.**

E. nivalis, Lin. The Snow Bunting. Head, neck, under parts, coverts of the wings, and the upper half of the quill-feathers, white ; top of the back, the three secondaries, bastard wings, and lower half of the quills black ; the three lateral feathers of the tail white, with a black streak ; the others black, edged with white ; legs black. The winter plumage is more of an ash-colour or brownish. 6 inches long.—*Selby, Illust.* pl. 52. fig. 7.

E. glacialis, Lath. ; *E. mustelina*, and *montana*, Gmel.

The colour of this species varies as it is in its winter or summer plumage, from white to brownish. In summer it inhabits the Arctic circle, but in winter it migrates to warmer regions. The northern parts of Scotland abound with them ; and they have been traced in various districts of Northumberland and Yorkshire, but scarcely, we believe, farther south. Their arrival in the southern countries is supposed to betoken a severe winter or heavy falls of snow. These birds do not perch, but continue on the ground, and run about like larks, which they also resemble in size, and in the length of their hind claws.

E. calcarata, Tem. (*Fringilla*, Pall. Gmel.) Top of the head black, with little red spots ; throat whitish, with black streaks ; a white stripe above the eyes and sides of the neck ; under parts white ; wings chestnut, with two transverse white bands ; neck, back, and scapulars reddish brown ; quills bordered with red ; tail slightly forked ; hind claw very long. $6\frac{1}{2}$ inches long. Inhabits Northern Europe.—*Tem. Man.* 322.

Gen. 4. TANAGRA, Lin.

Bill short, strong, triangular at the base, carinated, much compressed at the point, which is bent ; upper mandible longer than the under, and notched ; edges of the mandibles bent inwards ; under mandible straight, and somewhat gibbous towards the middle ; nostrils basal, lateral, rounded, partly concealed by projecting feathers ; tarsus the length of the middle toe ; external toe joined at its base, the internal free ; wings with the second and third quills longest.

The Tanagers have the habits of the sparrow tribes, and subsist on seeds, berries, and insects. Most of the species are conspicuous for the brilliancy of their plumage, and all are foreign.

T. Mississippiensis, Lath. (*Pyrranga*, Vieill.) Plumage entirely red, with the wings and tail of a darker shade ; legs reddish ; bill horn-coloured. Inhabits N. America.—*Lath. Ind.* 421.

T. flammiceps, Tem. (*Pyrranga*, Vieill.) Plumage brick-red, with the forehead, cheeks, and occiput red-brown ; wings brown, edged with reddish ; crest of the male vermilion. 7 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 177.

T. magna, Tem. (*Saltator*, Vieill.) Plumage above olive-brown, with the forehead and cheeks blue ; stripe near the jaw black ;

throat and vent red ; superciliæ and spot on the throat white. $8\frac{1}{2}$ inches long. Inhabits Guiana.—*Shaw*, x. 442.

T. atra, Desm. (*Saltator*, Vieill.) Plumage cinereous, quills and tail darkest, with the head in front and whole of the lower part of the neck black. 7 inches long. Guiana.—*Shaw*, xiv. pl. 3.

T. archiepiscopus, Desm. Head, throat, and breast violet ; lower belly and rump gray ; back olive ; upper lesser wing-coverts golden yellow, in the male ; female gray-brown, beneath cinereous, tinged with violet, and a violet spot on the eyes ; bill and legs black. 7 inches long. Inhabits S. America.—*Shaw*, xiv. pl. 4.

T. speculifera, Tem. (*Nemosia*, Vieill.) Plumage above olive-black ; with the throat, neck in front, back, rump, and under tail-coverts yellow, and a white spot on the wings. 5 inches long. Inhabits Brazil.—*Shaw*, xiv. pl. 2.

T. diademata, Tem. (*Nemosia*, Vieill.) Cheeks, nape, lesser wing-coverts, tail-coverts, back, outer web of all the quills and tail, and nearly all the under parts, blue ; tail, throat, and forehead black ; a red spot on the crown, and elongated white feathers on the occiput. Inhabits Brazil.—*Tem. Pl. Col.* 243.

T. viridis, Tem. Head and occiput yellowish green ; throat and neck in front green, the latter with a coppery blue half collar ; body above varied with blue and green ; beneath yellow ; wings green. Inhabits Brazil.—*Tem. Pl. Col.* 36. fig 3.

Gen. 5. PLOCEUS, Cuv. Tem.—*Loxia*, Lin.

Bill strong, conical, sharp, inflected, and compressed at the point, without a notch, edges of the mandibles bent inwards ; nostrils basal, near the surface of the bill, ovoid, and open ; tarsus of the same length as the middle toe ; the three anterior toes united at the base ; the fourth quill the longest.

P. Philippinus, Tem. (*Loxia*, Lin.) Philippine Weaver. Plumage brown above, whitish-yellow beneath ; crown of the head and breast yellow ; throat brown. The female has the upper parts brown, edged with rufous. $5\frac{1}{4}$ inches long. Inhabits Philippine Islands.—*Shaw*, ix. 315.

This bird forms a very curious nest, in the shape of a long cylinder, swelling out at the middle, composed of the fine fibres of leaves and grass, and fastened by the end to the branch of a high tree. This nest has two or three compartments, the eggs being deposited in that which is in the globose portion in the middle, the entrance being at the bottom of the long cylinder, and thus, in a great measure, concealed. The whole is generally suspended over water. The Philippine weaver may be rendered so very tame, as to come and perch on its master's hand, or to fetch and carry, like a dog, at command.

P. Abyssinicus, Tem. (*Loxia*, Gmel.) Abyssinian Weaver. Plumage yellow, with the crown, cheeks, throat, and breast black ; wings and tail brown. Size of the Hawfinch. Inhabits Abyssinia.—*Shaw*, ix. 294

This bird forms a nest of a pyramidal shape, which is suspended from the ends of branches. The opening is on one side, facing the east, being opposite to that

from which the rain proceeds; the cavity is separated in the middle by a partition of half its height, up which the bird mounts perpendicularly, and then, descending on the other side, forms its nest in the further chamber.

P. pensilis, Tem. (*Loxia*, Lin.) Pensile Weaver. Plumage green above, gray beneath; vent rufous, with the head and lower parts of the neck yellow; quills and tail-feathers black. 5 inches long. Inhabits Madagascar.—*Shaw*, ix. 275.

P. socius, Tem. (*Loxia*, Lath.) Sociable Weaver. Reddish brown above, yellowish beneath; capistrum black; tail short. 5½ inches long. Inhabits Cape of Good Hope.—*Shaw*, ix. 303.

These birds live in large societies, constructing their numerous connected nests on the branches of smooth barked trees, as a defence against serpents and monkeys.

P. Malimbicus, Tem. (*Tanagra*, Lath.) Plumage blue-black, with the crest, chin, and throat scarlet. 6 inches long. Inhabits Africa.—*Shaw*, *Nat. Mis.* pl. 581.

P. aurifrons, Tem. Plumage yellow-green, with the back and scapulars spotted with brown; forehead and cheeks of the male golden yellow; of the female ashy-yellow; body beneath citron yellow. 6 inches long. Inhabits Southern Africa.—*Tem. Pl. Col.* 175, 176.

Gen. 6. LOXIA, Briss.—*Crucirostra*, Cuv.

Bill rather long, strong, much compressed, the two mandibles equally convex and crossing each other at the points when at rest; nostrils round, basal, and lateral, concealed by reflected bristly feathers; the anterior toes entirely divided; wings with the first quill-feather longest; tail forked.

These birds inhabit the northern parts of Europe and America, and feed on the seeds of trees and alpine plants. Their singular formed bill enables them to pick out the seeds from the cones of the pine and fir. Their period of reproduction is unusual, being in the winter months; and they emigrate in summer to the Arctic regions. Their change of plumage is one of the most singular phenomena in their history. The bullfinches and grosbeaks, which were included under this generic title by the older naturalists, have been properly classed under another name.

L. pytiopsittacus, Bechst. Greater Cross-bill. Bill very strong, much bent, broad at its base, the crossing point of the lower mandible not surpassing the upper margin of the bill; plumage olive-ash-coloured; cheeks, throat, and sides of the neck gray; rump, breast, and belly greenish yellow; wings and tail brownish-black. 7 inches long. Inhabits N. Europe.—*Selby, Illust.* pl. 53**, fig. 1.

L. curvirostra, Lin. Cross-bill. Bill long, slightly curved, broad at the base, and the crossed point of the lower mandible projecting beyond the upper edge of the bill; body of a variable red; quills and tail-feathers brown; tail forked. The red of the male is varied with brown and green, and the female is olive-green, mixed with brown; but both sexes appear very different at different times of the year, and at different ages. 6 inches long. Inhabits Northern Europe. B.—*Selby, Illust.* pl. 53.

Gen. 7. PSITTIROSTRA, Tem.—*Loxia*, Lath.

Bill short, much hooked, gibbous at its base; upper mandible

bent at the point over the lower; lower broad, rounded, with obtuse point; nostrils basal, lateral, half covered by a feathered membrane; tarsus longer than the middle toe; toes divided, the lateral ones equal; wings, first feather obsolete, second shorter than the third.

P. psittacea, Tem. Plumage olive-brown; head and neck yellow. Inhabits Sandwich Islands.—*Shaw*, ix. 268.

Gen. 8. PYRRHULA, Briss.—*Loria*, Lin.

Bill short, thick, gibbous at the sides, compressed at the tip and towards the ridge; both mandibles convex, particularly the upper one, the tip of which overhangs the lower; nostrils basal, lateral, rounded, and most frequently concealed by feathers in front; tarsus shorter than the middle toe, the anterior toes divided to their origin; wings short, the fourth quill the longest; tail slightly rounded or square.

Most of the species belonging to this genus reside in the cold and temperate climates of the globe, subsist on hard grains and seeds, and undergo a double moulting.

P. enucleator, Tem. Pine Grosbeak. Head, neck, throat, breast, and rump bright crimson-red; back and scapulars black, the feathers deeply edged with red; wing-coverts tipped with crimson, forming two bars across the wings; quills and tail-feathers edged with pale crimson; flanks, belly, and vent grayish-white, tinged with crimson; bill black. $7\frac{1}{2}$ inches long. Inhabits Northern Europe, &c. B.—*Selby*, *Illust.* pl. 53*, fig. 1, 2.

P. rosea, Tem. Throat and face covered with silvery feathers; head, neck, rump, and lower parts lively crimson; back and scapulars black, bordered with crimson; two bands of white rose-colour on the wings, and the abdomen and lower coverts of the same colour; wings brown ash-coloured; bill brown. $5\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 333.

P. erythrina, Tem. (*Loria*, Pall.) Smaller feathers on the nostrils and bill faint rose-coloured; head, neck, and upper part of the back bright crimson; base of all the feathers red-brown; rump, sides of the head, throat, neck, and breast, crimson or rose-coloured; belly white; coverts of the wings brown ash-colour; tail forked. $5\frac{1}{2}$ inches long. Inhabits N. Europe.—*Tem. Man.* 336.

P. vulgaris, Briss. (*Loria*, Lin.) The Bulfinch. Head, throat, wings, and tail velvet black, tinged with violet purple; nape of the neck and back bluish gray; cheeks, neck, breast, belly, and flanks red; rump and vent white; great wing-coverts tipped and margined with pinkish white, forming a transverse bar across the wing; bill and legs blackish-brown. 6 inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 54, fig. 1, 2.

P. longicauda, Tem. A circle of red feathers around the bill; feathers on the top of the head, throat, and fore part of the neck acuminate and rose-coloured; breast and belly crimson-red;

feathers of the back and scapulars black in the centre, bordered with red; three lateral feathers of the tail white, with black spots. 6 inches long. Inhabits Siberia.—*Tem. Man.* 340.

P. lineola, Tem. (*Loxia*, Lin.) Bill gibbous and black, with a white spot on the base of the upper mandible, and a line of the same colour from the forehead to the crown; upper parts of the body glossy blue-black; under parts and base of the primaries white; tail black, slightly forked. Inhabits Africa.—*Shaw*, ix. 326.

P. minuta, Tem. (*Loxia*, Lin.) Plumage above gray-brown; beneath and rump ferruginous, with the fourth, fifth, and sixth, quill-feathers white at the base. Size of the Wren.—*Shaw*, ix. 334.

P. cinereola, Tem. Head, cheeks, back, and scapulars ashy-blue; under parts and spot on the wings white; wings and tail dusky; bill red; legs ash-coloured. $4\frac{1}{2}$ inches long. Inhabits Brazil.—*Tem. Pl. Col.* 11, fig. 1.

Gen. 9. FRINGILLA, Illig. Tem.

Bill short, stout, straight, and conical; upper mandible gibbous, depressed above, a little inclined at the point; nostrils basal, round, placed near the forehead, and partially concealed by the feathers in front; tarsus shorter than the middle toe, and the fore-toes entirely divided; wings short, the third and fourth quills the longest; tail of varied form.

The birds of this genus subsist on all sorts of seeds and grains, which they open with their bill, while they reject the husk, and they rarely partake of insect food. They are very generally scattered over the face of the earth, but are most numerous in the warm and hot latitudes. Many of them are subject to a twofold moulting, in which case the male takes in winter the plumage of the female.

* *Bill thick, gibbous, more or less dilated.*

F. coccothraustes, Tem. (*Loxia*, Lin.) The Hawfinch. Rump, head, and cheeks red brown; around the bill and throat deep black; neck ash-coloured; a longitudinal white stripe on the wings; tail-feathers white interiorly, and blackish-brown on the exterior web; lower parts wine-red; legs and bill grayish. 7 inches long. Inhabits Southern Europe. B.—*Selby, Illust.* pl. 55, fig. 1.

F. Chloris, Tem. (*Loxia*, Lin.) Green Finch or Green Linnet. Plumage yellowish-green, with the primary quills in front, and the four lateral tail-feathers, yellow; bill thick and whitish; head and back yellowish-green, edges of the feathers grayish; rump and breast yellow; tail slightly forked. The plumage of the female is less bright. $6\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 54, fig. 3.

F. petronia, Lin. Foolish Sparrow. Plumage brown ash-coloured, mixed with whitish on the lower parts; eyebrows reddish white; feathers generally terminated with whitish; a rounded white spot on the interior web of the tail-feathers, and a large yellow spot on the fore part of the neck. $5\frac{1}{2}$ inches long. Inhabits Europe.—*Shaw*, ix. 434.

F. domestica, Lin. The Common Sparrow. Top of the head and occiput bluish ash-colour; a chestnut band above the eyes, spreading on the sides of the neck; space between the bill and eye, throat, and neck before of a deep black; black feathers of the breast margined with white; feathers of the back and wings black, bordered with chestnut; a single white band across the wing. 5 inches long. Europe. B.—*Selby, Illust.* pl. 54, fig. 4, 5.

This well known bird, constantly found near the dwellings of man, is often persecuted for its depredations; though, according to Bradley, it is of essential service in the general economy of nature as limiting the reproductive powers of insects. That observer ascertained that one pair carried to their nest forty caterpillars in the space of an hour; so that, on the supposition of their entering the nest only during twelve hours each day, they would occasion a daily destruction of 480 caterpillars, or 3360 in a week. The flight of sparrows is short and laborious. They have no native song, and, for the most part, only a disagreeable chirp; but they are capable, when in confinement, of acquiring the notes of the linnet and other birds.

F. Cisalpina, Tem. Top of the head, neck, and part of the back, chestnut-coloured, bright in summer; region of the cheeks white; otherwise resembling the preceding. Inhabits Southern Europe.—*Tem. Man.* 351.

F. Hispaniolensis, Tem. Top of the head and neck bright deep chestnut; back and coverts black, but all the feathers margined laterally with reddish-yellow; throat and neck black; long black spots on the flanks; cheeks and middle of belly white; bill strong. Inhabits Spain.—*Tem. Man.* 353.

F. montana, Lin. (*Pyrgita*, Cuv.) Mountain Finch. Top of the head and occiput copper-red; space between the bill and eye, band over the eyes, throat, and fore part of the neck deep black; wings and tail deep brown; two white bands on the wings; breast ash-coloured; belly whitish; bill black. 5 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 55, fig. 2.

F. serinus, Lin. (*Carduelis*, Cuv.) Forehead, around the eyes, and band above the eyes, yellowish-green; stripe on the sides of the neck olive; rump and breast yellow; two transverse bands on the wings, one yellowish-green, the other brownish; belly whitish yellow, with bluish spots; tail slightly forked. $4\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 356.

** *Bill conical, more or less short, straight.*

F. Cælebs, Lin. The Chaffinch. Forehead black; top of the head and neck blue ash-coloured; back and scapulars chestnut, with an olive tinge; rump green; all the lower parts reddish wine-colour; abdomen white; wings and tail black; two transverse white bands on the wings, and a white spot on the lateral tail-feathers. 6 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 54, fig. 6, 7.

The Chaffinch is widely disseminated, and found in almost all parts of Europe, being sedentary in the warmer provinces, but migratory in those situate to the northward. They begin their short and frequently-repeated carol early in spring, and continue it till the summer solstice, after which they only chirp. In confinement they are capable of acquiring the notes of the canary, nightingale, &c.

F. montifringilla, Lin. The Mountain Finch. Head, cheeks, nape, and top of the back black ; throat, front of the neck, breast, scapulars, and smaller coverts of the wings orange-red ; a narrow orange transverse band on the wings ; the three exterior quills black ; rump and lower parts white ; flanks reddish, with black spots ; tail black. $6\frac{1}{2}$ inches long. Bird of passage in Europe. B.—*Selby, Illust.* pl. 54, fig. 8, 9.

F. nivalis, Lin. The Snow Finch. Top of the head, cheeks, and neck bluish ash-coloured ; scapulars and two of the secondary feathers of the wings brown ; coverts of the wings, the other secondary feathers, and those of the tail white ; lateral tail-feathers pointed with black ; lower parts whitish. 7 inches long. Inhabits Mountains in Europe.—*Tem. Man.* 362.

F. cannabina, Lin. Common or Brown Linnet. Bill strong, blackish, the breadth of the forehead ; throat whitish, marked in the middle with some brown spots ; top of the head and neck ash-coloured ; back, scapulars, and wing-coverts chestnut ; flanks reddish-brown ; middle of the belly white ; some of the quill-feathers black, bordered exteriorly with white ; tail forked, black. 5 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 55, fig. 3, 4.

The female Linnet is destitute of song. Linnets are very familiar, and easily tamed. When brought up under the nightingale, goldfinch, woodlark, &c. they acquire the respective songs of those birds.

F. montium, Gmel. Mountain Linnet. Throat, fore part of the neck, broad eyebrows, and the region of the eyes bright red ; feathers of the top of the head, neck, and back, black in the middle, bordered with red ; two bands of whitish-red upon the wings ; bill triangular ; legs black. $4\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 55, fig. 5.

F. Canaria, Lin. Canary Bird or Canary Finch. Bill and body whitish-yellow ; quills and tail-feathers greenish. $5\frac{1}{2}$ inches long.

This bird in its wild state, as observed by Labillardière and others, exhibits a brown hue, mixed with various others, and its plumage is not so attractive as it becomes in confinement. In consequence of long domestication, it has, like the dog, assumed an almost endless series of varieties. The colours of the female are paler than those of the male. It principally occurs in the Canary Islands, frequenting damp places ; and at Palma, Fayal, Cape Verd, and Madeira. From the Canary Islands they appear to have been brought into Europe about the beginning of the fourteenth century, and have been generally diffused over almost every civilized country, owing to the powerful attractions of their song, combined with the gracefulness and tenderness of their manners and their great docility. When imported from their native country they are often silent, or have but an indifferent song ; and the fine warble to which our ears are so familiar, is usually modelled on that of the titlark or of the nightingale. Most of those from the Tyrol have been educated under parents, whose progenitors were instructed by a nightingale ; but the English-bred Canary birds have more of the titlark's notes.

*** *Bill conical, long, straight, and compressed ; point of the mandibles sharp.*

F. citrinella, Lin. Throat, breast, and middle of the belly yellowish-green ; occiput, sides of the neck, and flanks cinereous ; back, scapulars, coverts, and transverse band on the wings deep yel-

lowish-green; wings and tail black, bordered with greenish. $4\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Tem. Man.* 370.

F. spinus, Lin. The Siskin. Top of the head and throat black; shaded with greenish on the neck; a broad yellow band behind the eyes; back and scapulars greenish, with a little black streak on each feather; two bands on the wings, one black, the other greenish-yellow; wings and the extremity of the tail black. $4\frac{1}{2}$ inches long. Inhabits N. Europe. B.—*Selby, Illust.* pl. 55, fig. 6, 7.

F. linaria, Lin. (*Linaria*, Vieill.) Red-headed Linnet. Top of the head, breast, lateral parts of the belly and rump, crimson-coloured; belly rose-coloured; upper parts reddish-ash-coloured, with longitudinal black spots; wings, throat, and tail black. 5 inches long. Inhabits Europe. B.—*Selby, Illust.* pl. 54, fig. 10.

F. carduelis, Lin. (*Carduelis*, Cuv.) The Goldfinch. Forehead and throat crimson; occiput and neck black; fore part of the neck and lower parts of the body white; back, scapulars, and lateral parts of the breast brown; upper half of the wing-feathers pure yellow, the other black, with whitish spots towards the end; tail black, with whitish longitudinal spots; bill whitish, the tip black. $5\frac{1}{2}$ inches long. Europe. B.—*Selby, Illust.* pl. 55, fig. 8, 9.

F. cucullata, (*Carduelis*, Swainson.) Plumage orange-coloured, with the head, throat, a band across the coverts, quills, and tail black; primary quills at the base obliquely banded with orange. 4 inches long. Inhabits South America.—*Swainson, Zool. Ill.* pl. 7.

F. melanotis, Tem. Plumage above olive-green, beneath whitish-red, with a black spot on the eyes and ears; head and neck behind lead-coloured; rump and upper coverts vermilion-red. $3\frac{1}{2}$ inches long. Inhabits Southern Africa.—*Tem. Pl. Col.* 221, fig. 1.

Gen. 10. PHYTOTOMA, Gmel.

Bill short, strong, conical, edged, with the margins of the mandibles serrated and equal; nostrils basal, lateral, ovoid; four toes, three before, one behind.

P. rara, Gmel. Chili Plant-Cutter. Plumage dusky gray above, paler below; quills and tail-feathers spotted with black; tail rounded. Size of a quail. Inhabits Chili.—*Shaw*, ix. 336.

Gen. 11. HYREUS, Stephens.

Bill conical, thick, straight, somewhat serrated; nostrils ovate; feet with three toes, two before and one behind.

H. Abyssinicus, Steph. (*Phytotoma tridactyla*, Daud.) Plumage above black, with the head, throat, and jugulum red; wing-coverts brown, with white margins. Abyssinia.—*Shaw*, ix. pl. 53.

Gen. 12. COLIUS, Gmel.

Bill short, thick, conical, somewhat compressed at the point; mandibles convex, the upper one covering the lower: nostrils

basal, lateral, partly concealed by feathers; tail very long, conical; tarsus short, the hind toe reversible; the anterior toes divided; wings short; the third quill longest.

The birds of this genus are natives of Africa or India, climb somewhat in the manner of parrots, live in troops, build numerous nests on the same bushes, and sleep suspended on the branches, with their head downwards. They feed on fruits.

C. Capensis, Gmel. (*Loria*, Lin.) Cape Coly. Outer edges of the exterior tail-feathers white; body cinereous above, whitish beneath. Size of the chaffinch. Cape of Good Hope.—*Shaw*, x. pl. 1.

C. Senegalensis, Gmel. Head, neck, and breast tinged with purplish; the feathers on the top and hind parts of the head green, and formed into a crest; rest of the upper parts pale-gray; tail bluish, the middle feathers above eight inches in length. Inhabits Africa.—*Shaw*, x. 5.

ORDER V.—ZYGODACTYLOUS BIRDS. *Zygodactyli*.

Bill of various form, more or less curved, or much hooked, and often straight and angular; feet always with two toes before, and two behind, and the exterior hind toe frequently reversible.

The distinctive character of the birds of this order is chiefly the disposition of the toes in pairs. Many of them chiefly or exclusively live on caterpillars, worms, and insects, but others on soft or hard fruits, and most of them nestle in the holes of decayed trees.

FAMILY I.—*Bill more or less curved; feet with two toes before and generally two behind, the exterior hind toe sometimes reversible.*

Gen. 1. MUSOPHAGA, Tem.—*Opæthus*, Vieill.

Bill short, stout, broad, ridge arched and elevated, notched at the point, extremity of the lower mandible forming an angle; nostrils basal, and often concealed by feathers; legs stout, tarsus equal in length to the middle toe; the exterior reversible; lateral toes equal; the fourth and fifth quills the longest.

M. Africana, Tem. (*Opæthus*, Vieill. *Cuculus*, Lin.) African Touraco. Plumage bluish green, the feathers on the head lengthened into a crest, capable of erection; quill-feathers crimson, margined with black; tail bluish purple; belly, thighs, and under tail-coverts blackish. Inhabits Africa.—*Shaw*, ix. pl. 15.

M. Paulina, Tem. Plumage above glossy copper-coloured; belly and vent dull copper-green, glossed with bluish; a large white spot round the eye; crest and quill-feathers red; bill orange. Inhabits Southern Africa.—*Shaw*, xiv. pl. 26.

M. violacea, Tem. Plumage deep violet, except on the lower part of the wings, where the quill-feathers are bright purple, or rather crimson, tipped with violet, and the crown of the head, which is

also purple ; beneath the eyes a white stripe pointing backwards ; upper mandible vaulted over part of the forehead. 19 inches long. Inhabits Africa.—*Shaw*, viii. pl. 4, 5.

Gen. 2. INDICATOR, Vieill.

Bill short, depressed, dilated on the sides, a little bent and notched at the point ; ridge distinct ; nasal furrow large ; nostrils basal, a little tubular ; tarsus shorter than the external toe ; the anterior toes united to the first joint ; wings with the third feather the longest.

I. *major*, Stephens. Great Honey-guide. Upper part of the head, hinder part of the neck, wing-coverts, and back brownish olive-green ; rump and tail-coverts white ; breast and under parts pale yellow, the middle of the neck with black spots. 10 inches long. Inhabits Africa.—*Shaw*, ix. pl. 27.

I. *minor*, Steph. Plumage olive gray, with the quills brownish, margined with yellow ; belly and tail whitish, the latter with the middle feathers black ; bill and legs brown. Inhabits Southern Africa.—*Shaw*, ix. 140.

Gen. 3. CUCULUS, Lin.

Bill as long as the head, compressed and slightly curved ; nostrils basal, pierced in the margin of the mandible, and surrounded by a naked and prominent membrane ; legs feathered below the knee ; fore toes united at their base ; hind toes divided, the exterior reversible ; tail long, more or less graduated ; the third quill-feather the longest.

The Cuckoos are a shy and solitary race of birds, which live chiefly on insects and caterpillars, and are remarkable for depositing their eggs in the nests of some of the smaller birds. Only one species is a native of Great Britain.

C. *canorus*, Lin. Common Cuckoo. Head, neck, breast, and upper parts deep bluish gray, darkest on the wing-coverts ; belly, thighs, and under tail-coverts white, with transverse black bars ; tail-feathers blackish, spotted with whitish, as are the exterior webs of the quills ; membranous margin of the bill and around the eyes orange yellow. $10\frac{1}{2}$ inches long. Europe. B.—*Selby*, *Illust.* pl. 37 and 45***, fig. 1.

This well known species usually makes its appearance in Britain early in April, and begins to utter the cry from which it has derived its name, in almost every language, about the middle of the month. This, which is the note of the male, ceases about the close of June, and the birds soon after leave the country, the old ones in July, and the young in the beginning of September. The nest which the female cuckoo selects for the deposition of her egg is commonly that of the hedge sparrow, though sometimes that of the water-wagtail, yellow-wren, titlark, yellow-hammer, green-linnet, or some other small insectivorous bird. The female is somewhat smaller than the male, but has generally the same markings. The details of colouring, however, are so much subject to variation in this species, that scarcely two are marked alike.

C. *clamosus*, Lath. Plumage bluish black ; wing-feathers fuscous ; feet yellowish ; bill black. 10 inches long. Inhabits Southern Africa.—*Shaw*, ix. 108.

- C. cupreus*, Lath. Head, neck, and upper parts of the body brilliant copper-colour, with a golden gloss ; belly and thighs yellow ; tail wedge-shaped, with the exterior feathers marked with a triangular white spot at their tip ; legs black. Size of the Lark. Inhabits Africa.—*Shaw*. ix. 129.
- C. chalcites*, Tem. Plumage metallic green, with the head red, glossed with bronze ; tail red at the base, greenish in the middle, white at the tip ; belly white ; neck anteriorly and breast varied with brown. $5\frac{1}{2}$ inches long. Australasia.—*Tem. Pl. Col.* 103. fig. 2.
- C. Klasii*, Vieill. Brilliant copper green on the head and upper parts ; eyebrows white ; wing-feathers bronze green above, black and spotted with white below ; under parts pure white ; lateral feathers of the tail white within, with blackish transverse lines ; bill and legs black. 7 inches long. Inhabits Africa.—*Shaw*, ix. 128.

Gen. 4. COCCYZUS, Vieill.—*Cuculus*, Lin.

Bill strong, compressed in all its length, ridge distinct, slightly bent from its base ; lower mandibles straight, inclined at the point ; nostrils basal, lateral, half shut by a naked membrane ; legs slender ; tarsus much longer than the exterior toe ; wings short and rounded, the first five feathers graduated.

- C. Cayanus*, Tem. Plumage above purplish chestnut, paler beneath ; tail wedge-shaped, all the feathers tipped with white. 16 inches long. Inhabits Cayenne.—*Shaw*, ix. 90.
- C. nævius*, Tem. Plumage above brownish ferruginous ; beneath rufous white ; hind part of the neck rufous gray, with deep brown down the shafts, back, and rump ; quills grayish brown, with a rufous spot near the tips ; tail tipped with reddish. $10\frac{1}{2}$ inches long. Inhabits Guiana.—*Shaw*, ix. 99.
- P. Geoffroyii*, Tem. Plumage above bronzed green with a golden gloss ; forehead, cheeks, neck anteriorly, and breast brown, the tips of the feathers with a reddish white crescent ; crest bluish ; belly yellowish ; tail wedge-shaped. 19 inches long. Inhabits South America.—*Tem. Pl. Col.* 7.

Gen. 5. CENTROPUS, Illig.—*Corydonyx*, Vieill.—*Polophilus*, Leach.

Bill thick, strong, compressed, deeper than broad, carinated, arcuated towards the tip ; nostrils basal, lateral, diagonally cleft ; legs long, robust ; tarsus longer than the exterior toe ; the two anterior joined at the base ; inner hind toe with a long subulate claw.

- C. Ægyptius*, Tem. (*Cuculus*, Lath.) Egyptian Coucal. Plumage dull green above, reddish white beneath ; head, back of the neck, and tail of a beautiful green ; wings red ; tail wedge-shaped. 15 inches long. Inhabits Egypt.—*Shaw*, ix. 54.
- C. rufinus*, Cuv. Plumage above rufous, with the feathers streaked

with light red or white; wings and tail reddish, the interior hinder claw long and straight. 11 inches long. Inhabits Africa.—*Shaw*, ix. pl. 8.

- C. gigas*, Cuv. Wing-coverts and back brownish red, the shafts pale red, and the feathers bordered with brownish black; under part of the body reddish, bordered with sooty black; tail tipped with whitish. 30 inches long. Inhabits Africa.—*Shaw*, ix. 45.
- C. phasianus*, Tem. Back and wings varied with rufous yellow, brown and black; bill, head, neck, and under parts blackish; tail long, black, with transverse bands. 17 inches long. Inhabits New Holland.—*Shaw*, ix. pl. 11.

Gen. 6. PHÆNICOPHAUS, Vieill.—*Cuculus*, Gmel.

Bill longer than the head, strong, thick, rounded, smooth, arcuated, the base with divergent bristles; nostrils lateral, linear, distant from the base; orbits naked, papillated; tarsus longer than the external toe; wings short.

- P. pyrrhocephalus*, Tem. The Malkoha. Crown and part of the cheeks bright crimson, surrounded by a band of white; hind part of the head and neck black, with white spots; front of the neck, back, and wings black; tail very long, wedge-shaped, tip white; breast and belly white; legs pale blue. 16 inches long. Inhabits Ceylon.—*Shaw*, ix. 59.
- P. leucogaster*, Steph. Plumage greenish-black, with the belly and tail-feathers margined with white; throat and neck dull green; head round the eyes orange. 9 inches long. Inhabits Africa.—*Shaw*, ix. pl. 14.

Gen. 7. LEPTOSOMUS, Vieill.—*Cuculus*, Lin.

Bill almost triangular, laterally compressed, with prominent ridge; upper mandible a little bent, the lower straight; nostrils in the middle of the bill, half shut by an elongation of the corneous matter; tarsus broad, depressed, covered with rough scales; wings long, the fourth quill longest; tail long, equal.

- L. afer*, Tem. Body beneath and forehead whitish, top of the head and neck behind black; wing-coverts green, with red margins; tail blue-black. 15 inches long. Inhabits Africa. The only species of the genus.—*Shaw*, ix. 25.

Gen. 8. SCYTHROPS, Lath.

Bill long, convex above, laterally compressed, curved at the tip, the upper mandible longitudinally grooved; nostrils basal, naked, rounded; orbits naked; tarsus shorter than the middle toe, the two exterior toes joined at the base; tail long, rounded.

- S. Novæ Hollandiæ*, Tem. Plumage lead-coloured, with the tail-feathers barred black and white. 17 inches long; bill four in-

ches. The only species of the genus. Inhabits New Holland.—*Shaw*, viii. pl. 50.

Gen. 9. PTEROGLOSSUS, Illig.—*Ramphastos*, Lin.

Bill slender, longer than the head, convex above, externally serrated, and tip curved; nostrils vertical, orbicular, open; tarsus the length of the external toe; the two anterior toes united to the second joint; wings short, concave, the first four quills unequally graduated; tail long, graduated.

The Pteroglossi inhabit the southern regions of the globe. Their bill is somewhat smaller in proportion than the Toucans, and their plumage generally green or yellowish, with red or yellow on the throat and breast.

P. Aracari, Tem. Plumage blackish green, with yellow abdomen, red middle abdominal bar and rump, and cuneated tail; upper mandible with a longitudinal black stripe. 17 inches long; bill four inches. Inhabits S. America.—*Shaw*, viii. pl. 49.

P. viridis, Tem. Head and neck deep black; back, wings, and tail blackish green; breast, belly, and vent yellow; rump red; upper mandible yellow at the top, reddish at the sides, with a line of black between. 14 inches long; bill near three inches. Inhabits Cayenne.—*Shaw*, viii. pl. 48.

P. sulcatus, Swainson. Plumage green, paler below; jugulum whitish; round the eyes blue; bill with two longitudinal grooves. 12 inches long; bill three.—*Zool. Illust.* i. pl. 44.

Gen. 10. RAMPHASTOS, Lin.

Bill cellular, thin, transparent, broader than the head at the base, convex above, serrated at the edges, and a little incurved at the tip; nostrils vertical, concealed behind the corneous mass, surrounded by a membrane; tarsus as long as the external toe; the two anterior toes united to the second joint; tail short.

R. toco, Lath. The Toco Toucan. Plumage black, with the fore part of the neck and rump white; vent red; bill reddish, with black tip. 17 inches long; bill eight inches. Inhabits Cayenne.—*Shaw*, viii. pl. 46.

R. vitellinus, Illig. Throat golden yellow; sides and ears white; pectoral band and wing-coverts red; bill black, with a blue bar at the base, edges thickened.—*Swains. Zool. Illust.* i. pl. 56.

Gen. 11. CROTOPHAGA, Lin.

Bill short, thick, much compressed, carinated above, its edges angulated; legs long, slender; tarsus a little longer than the external toe; wings short, tail of eight broad feathers, rounded.

C. ani, Lin. American Keel-bill. Plumage violet black, with a green tint; tail wedge-shaped. Size of a blackbird.—*Shaw*, viii. pl. 51.

Gen. 12. TROGON, Lin.

Bill shorter than the head, thick, arcuated, broader than high,

bent at the point, dentated on the margin, with long bristles at the base ; nostrils basal, open ; legs short ; tarsus shorter than the external toe, partly covered by feathers ; the exterior toe reversible ; the fifth quill-feather longest.

T. viridis, Lin. The Green Curucui. Upper part of the head violet, with a mixture of golden green ; sides of the head and throat black ; upper parts of the body golden green, with a band of the same colour on the breast ; beneath orange yellow ; the thighs nearly black ; three lateral tail-feathers obliquely dentated with white. $11\frac{1}{2}$ inches long. Inhabits Cayenne.—*Shaw*, ix. pl. 4.

T. rufus, Lath. General colour rufous, the belly, thighs, and vent yellow ; wing-coverts striated with black and gray ; three lateral tail-feathers striated with black and white, and white tips. 9 inches long. Inhabits Cayenne.—*Shaw*, ix. pl. 3, 3*.

T. sulphureus, Spix. Plumage glossy greenish above ; forehead, throat, and thighs black ; wing-coverts black, crenulated with white ; abdomen sulphureous ; tail glossy copper-coloured, beneath black, with the three outer feathers banded with black and white ; female blackish. 8 inches long. Brazil.—*Spix*, *Avium*, pl. 38. fig. 1, 2.

T. Reinwardtii, Tem. Head, cheeks, sides of the neck and band on the breast green, tinged with olive ; throat, belly, and under tail-coverts yellow ; wing-coverts striped with green and yellow ; orange spots on the body. 11 inches long. Java.—*Tem. Pl. Col.* 124.

Gen. 13. CAPITO, Vieill.—*Tamatia*, Cuv.—*Bucco*, Lath.

Bill long, straight at the base, broader than deep, point compressed ; upper mandible bent at the point and surpassing the under one ; nostrils basal, lateral, in the corneous substance, entirely concealed by stiff hairs ; tarsus the length of the exterior toe ; the two anterior toes united to the second joint ; wings short.

C. macrorhynchos, Tem. Plumage black, with the forehead, throat, front of the neck, abdomen, and tip of the tail white ; bill very large, hooked, and black. Cayenne.—*Swainson*, *Zool. Ill.* ii. pl. 99.

C. collaris, Tem. Plumage above rufous, with a band on the shoulders fulvous, on the breast black ; throat and belly whitish ; tail transversely striated with black. $7\frac{1}{2}$ inches long. Inhabits Guiana.—*Shaw*, ix. pl. 7.

C. melanotis, Tem. Throat, neck, under parts of the body and wing-coverts white ; sides more or less dotted or striped with black ; top of the head, back, and wings red, waved with black lines ; region of the ears and part of the neck black. 8 inches long.—*Tem. Pl. Col.* 94.

Gen. 14. *Bucco*, Lin.

Bill strong, pointed, laterally compressed, covered with strong bristles at the base ; upper mandible emarginated and incurved ;

nostrils basal, lateral; tarsus shorter than the exterior toe; the anterior toes united to the second joint; wings short.

- B. grandis*, Tem. The Great Barbet. Plumage above fine green, with the quill-feathers variegated with black; head and neck blue; vent red; bill whitish, with the tip black. 11 inches long. Inhabits China.—*Shaw*, ix. 40.
- B. Javensis*, Horsfield. Plumage emerald green above, below paler; the top of the head orange; a double black stripe on the sides of the head, the one superciliary, the other uniting on the nape; throat and transverse band on the back of the neck crimson. 11 inches long. Inhabits Java.—*Lin. Trans.* xiii. 181.
- B. versicolor*, Tem. Plumage green, paler below; crown red; a band on the sides of the head above blue, below black, and behind the eyes a rufous spot. $10\frac{1}{2}$ inches long. Inhabits Sumatra.—*Tem. Pl. Col.* 309.
- B. gularis*, Reinwardt. Plumage dark green above, beneath paler; forehead and throat turquoise blue; a spot on the latter black or dusky, and edged with yellow; a citron-coloured stripe at the gape.—*Tem. Pl. Col.* 89. fig. 2.

Gen. 15. POGONIAS, Illig.—*Bucco*, Lath.

Bill short, strong, with a prominent arched ridge; cutting edge of the upper mandible with one or two strong teeth, and furrowed or smooth; lower mandible less deep than the upper; nostrils basal, lateral, with rigid bristles at the base; tarsus the length of the exterior toe; the two anterior united to the second joint.

All the species of this genus are natives of Africa.

- P. sulcirostris*, Tem. Upper parts of the body, wings, and tail black, with a white spot on the back; throat, neck, belly, and an obscure stripe on the wings scarlet; sides yellowish; quills dark brown; upper mandible with one longitudinal, the under with many transverse grooves. 9 inches long. Africa.—*Shaw*, ix. pl. 1.
- P. niger*, Tem. Throat, jugulum, breast, and nape black; forehead red; neck on both sides with two striæ and with the abdomen whitish; wings and tail yellow, varied with black. $6\frac{1}{2}$ inches long. Cape of Good Hope.—*Leach, Zool. Mis.* ii. pl. 116.
- P. personatus*, Tem. Plumage ashy-green, with the crown, throat, and neck entirely vermilion red; nape and breast deep black; wings and tail brown, edged with yellow; belly greenish white. 7 inches long. Inhabits Africa.—*Tem. Pl. Col.* 201.

Gen. 16. PSITTACUS, Lin.

Bill short, thick, gibbous, very strong, convex above and below, much bent and hooked at the point; lower mandible short, obtuse; base of the bill with a cere; head large; nostrils orbicular, pierced in the cere, open; legs short, robust;

tarsus shorter than the external toe ; the interior toes united at their base ; tail of varied form.

This large genus is at once to be distinguished by the peculiar structure of the bill. Their food is chiefly fruits ; they have in general a brilliant plumage ; and inhabit the Southern hemisphere of the globe. In climbing they are greatly assisted by their bill. The genus may be divided into four sections.

* *No crest on the head.*

P. melanocephalus, Lin. White-breasted Parrot. Plumage green above, brownish luteous ; breast whitish ; quill-feathers tipped with blue ; bill and legs dusky. Size of a Pigeon. Inhabits Mexico. —*Edw.* pl. 169.

P. mitratus, Tem. Head deep green, with the sinciput of a scarlet blood-colour ; face, occiput, and throat, varied with green and scarlet ; outer webs of the quills blue, margined with green and yellow ; tail beneath green blue, above green, the tip obscure blue. Inhabits Brazil.—*Tem. Pl. Col.* 207.

P. cyanotis, Tem. (*P. Braziliensis*, Lin.) Plumage grass-green, rather paler beneath, the feathers edged with purplish brown ; round the base of the bill bright red ; cheeks deep-blue, and top of the head yellow ; edge of the wings red, the wing-coverts and secondaries edged with yellow, the primaries dusky blue ; outer tail-feathers blue, the next red, and the others green, tipped with yellow. Inhabits Brazil.—*Shaw*, viii. pl. 77.

P. accipitrinus, Lin. Plumage green, with ferruginous head and neck, waved with blue ; quill and tail-feathers edged with blue. Size of a small Pigeon. Inhabits Guiana.—*Edw.* pl. 165.

P. erythacus, Lin. Gray Parrot. Plumage ash-gray, deeper on the upper parts, and more inclining to white below ; orbits naked and white ; tail crimson ; bill black. About 12 inches long. Inhabits Africa.

This well known species is remarkable for its docility, the distinctness of its articulation, and its loquacity. It readily imitates every sound within its hearing. The gray Parrot is extremely long-lived ; and M. Vaillant mentions one as having lived at Amsterdam in domesticity for seventy-three years after its arrival in Europe. It moulted regularly every year till the age of sixty-five, after which its moulting was irregular, and the red feathers of the tail were replaced by yellow ones.

** *With a pendulous or falling crest.*

P. cristatus, Lin. Broad-crested Cockatoo. Plumage white, with a tinge of rose-colour on the head and breast ; crest on the head large, arching over the whole head, white above, scarlet beneath ; capable of erection or depression ; orbits of the eyes naked ; tail short ; bill black. Size of a common fowl. Inhabits Moluccas. —*Shaw*, viii. pl. 72.

P. sulphureus, Lath. Sulphur-crested Cockatoo. Plumage white, with a shade of pale yellow on the breast, sides, and wing-coverts ; a large yellow spot beneath each eye ; crest lengthened and pointed, slightly reversed at the tip ; bill black. 15 inches long. Inhabits Moluccas.—*Shaw*, viii. pl. 73.

P. Cookii, Tem. Crimson-tailed Cockatoo. Plumage black, more or less spotted with yellowish; crest small; tail bright crimson, the base and tip black. 20 inches long. New Holland.—*Shaw*, xiv. pl. 14.

P. Eos, Tem. Head, neck, all the under parts, and inner surface of the wings rose-coloured; the rest of the plumage gray, deeper on the wings and tail; bill yellowish. 12 inches long.—*Tem. Pl. Col.* 81.

*** *Face naked, or striped with feathered lines; tail long, wedged, acute.*—MACROCERCUS, Vieill.

P. macao, Lin. Scarlet Maccaw. Head, neck, breast, belly, and thighs, upper part of the back, and lesser coverts of the wings bright red or scarlet-colour; wings blue above, faint red below, coverts yellow; tail-coverts blue; tail with the middle feathers red, the lateral ones partly blue; cheeks wrinkled and naked. Inhabits S. America.—*Edw.* pl. 158.

P. Aracanga, Lin. Plumage scarlet, with the greater wing-coverts yellow, tipped with green and blue; quills above blue, beneath rufous; cheeks naked. 2 feet 10 inches long. Inhabits Guiana.—*Vaill. Per.* pl. 2.

P. ambiguus, Bechst. Plumage brown-green, with the forehead scarlet, quills and rump blue; tail rufous above, back yellow, the tip blue; cheeks naked, with plumose lines. About 2 feet long. Inhabits South America.—*Vaill. Per.* pl. 6.

**** *Tail long, graduated.*

P. pulchellus, Tem. Plumage green, yellow beneath; wings and frontlet blue; two middle tail-feathers green, the lateral ones yellow, with a black streak near the shaft. $6\frac{1}{2}$ inches long. Inhabits New Holland.—*Shaw*, viii. 470.

P. eximius, Shaw. Head, neck, and breast scarlet; wings and tail blue; back black, undulated with green; abdomen yellowish; bill horn-coloured. New Holland.—*Shaw*, viii. pl. 57, 58.

P. scapulatus, Bechst. (*P. Tabuensis*, Shaw.) Back, wings, and tail deep grass-green; with a paler band across the smaller wing-coverts; head, neck, and whole under parts bright scarlet. 16 inches long. Inhabits New South Wales.—*Shaw*, viii. pl. 55.

P. setarius, Tem. Forehead, cheeks, neck, and all the under parts of the body fine green; bluish on the forehead, a red spot between the bill and eyes, and an orange band between the neck and back; two middle tail-feathers elongated, with part of the shafts naked. 11 inches long. Inhabits Indian Archipelago.—*Shaw*, xiv. pl. 16.

P. formosus, Lath. The Ground Parrot. Plumage green on the back, spotted with black and yellow; forehead as far as the eyes red; tail strongly cuneated, and consisting of sharp-pointed feathers of the finest yellow, crossed by numerous arrow-shaped black bars. Size of the Pigeon. Inhabits New Holland.—*Shaw*, viii. pl. 66.

FAMILY II.—*Bill straight and angular.*

Gen. 17. PICUS, Lin.

Bill long, or medium-sized, straight, angular, wedge-shaped at the tip ; nostrils basal, open, covered by setaceous feathers ; tongue round, vermiform ; legs strong ; two toes before and two behind, rarely one behind ; anterior toes joined at their base, the posterior divided ; tail of twelve feathers, the lateral very short.

The birds of this genus live in forests, and feed chiefly on insects and their larvæ. Their strong hooked claws enable them, by the assistance of their tail, to climb the trunks of trees in search of their food, and strike or perforate the bark with their bill ; and their long tongue, armed with reflected bristles, serves them for procuring it in the crevices and holes of the bark.

P. martius, Lin. Great Black Woodpecker. Black, with the crown red ; part of the tarsus covered with feathers ; bill dark ash-coloured, whitish on the sides. 17 inches long. Inhabits Europe.—*Shaw*, ix. pl. 29.

P. viridis, Lin. Green Woodpecker. Plumage above green, with a scarlet crown, and rump yellow ; below yellowish gray. 12½ inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 38, fig. 1.

P. canus, Gmel. Forehead crimson red, line between the eye and bill blackish ; two black bands on the sides of the neck ; occiput, cheeks, and neck clear ash-coloured ; back bright green, rump yellowish ; wings olive green, with white spots on the exterior webs of the quills, ash-coloured below ; joint of the knee feathered. 11½ inches long. Northern Europe.—*Tem. Man.* 393.

P. major, Lin. Greater Spotted Woodpecker. Plumage varied with black and white ; back of the head and vent red ; female without red on the occiput ; bill dusky, irides reddish-brown. 9 inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 38, fig. 2.

P. leuconotus, Bechst. Band of the forehead whitish yellow ; top of the head and occiput bright red ; cheeks, sides, fore part of the neck, middle of the belly, back, and rump white ; abdomen and inferior coverts of the tail crimson ; two middle tail-feathers black. 10½ inches long. Inhabits Northern Europe.—*Tem. Man.* 396.

P. medius, Lin. Back and wings black ; middle coverts of the wings, scapulars, and spots on the webs of the wing-feathers white ; abdomen and lower coverts of the tail crimson ; coronal and occipital feathers red, slender, and elongated ; bill short, compressed and pointed. 8 inches long. Inhabits Europe.—*Tem. Man.* 398.

P. minor, Lin. The Lesser Spotted Woodpecker. Forehead, region of the eyes, sides of the neck, and lower parts dirty white ; upper part of the back and lesser wing-coverts glossy black ; rest of the upper parts with black and white bands : quills black, spotted with white ; lateral tail-feathers black, banded with white. 5½ inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 38, fig. 3.

- P. principalis*, Lin. White-billed Woodpecker. Plumage black, with a line on both sides of the neck and secondary quills white; tail black; bill channeled and white. 16 inches long. Inhabits America.—*Shaw*, ix. pl. 30.
- P. galeatus*, Tem. Crested Woodpecker. Crest, head, and whiskers vermilion red; region of the ears striped with black and whitish; body above reddish; below transversely striped with black and red. 11 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 171.
- P. aurulentus*, Tem. Plumage above green; beneath striped with whitish and green; top of the head and occiput red; cheeks with two golden and one greenish stripe; throat pale yellow. $8\frac{1}{2}$ inches long. Inhabits Brazil.—*Tem. Pl. Col.* 59, fig. 1.
- P. tridactylus*, Lin. (*P. hirsutus*, Vieill.) Top of the head golden yellow; occiput and cheeks shining black; forehead varied with white and black; a white band above and below the eyes; fore part of neck and breast white; top of the back, sides of the breast, flanks, and abdomen striped black and white; two toes before and one behind. 9 inches long. Europe, &c.—*Shaw*, ix. pl. 38.

Gen. 18. GALBULA, Briss.

Bill long, straight, or slightly bent at the point, quadrangular, pointed; nostrils basal, oval, covered in part by a naked membrane; legs short; tarsus shorter than the external toe; the fore toes united to the third joint.

This genus inhabits the warmer regions of America.

- G. grandis*, Lath. Great Jacmar. Upper parts of the body golden copper-coloured; beneath ferruginous; throat with a white band; primary quills brown; tail long, wedge-shaped. 12 inches long. *Shaw*, ix. pl. 40.
- G. viridis*, Lath. (*Alcedo galbula*, Lin.) Body of a golden green above; throat white; belly and vent rufous; tail long, wedge-shaped, of ten feathers; irides blue. Size of the lark. Inhabits Brazil.—*Shaw*, ix. pl. 39.

Gen. 19. YUNX, Lin.—Wryneck.

Bill short, straight, in the form of a depressed cone; ridge rounded; slender at the tip; nostrils basal, naked, partly closed by a membrane; the two fore toes united at their origin, the hind ones divided; tongue long, lumbriciform, armed at the point with a horny substance; tail with ten soft flexible feathers.

The Wrynecks have many of the habits of woodpeckers, but are not so capable of climbing trees, and chiefly fix on the bark to extract insects from the crevices. They also frequent ants' nests, preying on the ants and their larvæ. There are only two foreign species of this genus mentioned by authors, the *Y. minutus*, (*Picus minutus*, Lath.) and a new species from South America.

ORDER VI.—ANISODACTYLI.

Bill more or less arched, often straight, always subulate, and slender; feet with three toes before and one behind, the exterior united at the base to that in the middle, the hinder one generally long, and all provided with long and bent claws.

The birds of this division have more or less the manners and habits of those of the preceding order; for almost all of them are climbers, and insectivorous. Their tongue is more or less extensible. The character of the order, as implied in the name, is having the toes of unequal length.

Gen 1. OXYRHYNCHUS, Tem.

Bill short, straight, triangular at its base, attenuated and awl-shaped at the point; nostrils basal, lateral, naked, and partly covered by a membrane; tarsus short, nearly the length of the middle toe; three toes before, the lateral equal, the external joined at the base, the internal divided; fourth and fifth quill-feathers longest.

O. flammiceps, Tem. Plumage of back and wings fine olive green; beneath yellowish white, with dusky spots; head with crimson incumbent crest, its sides with three transverse yellowish lines. 7 inches long. Inhabits Brazil.—*Shaw*, xiv. pl. 24. The only species of the genus.

Gen. 2. SITTA, Lin.

Bill straight, cylindrical, slightly compressed, tip acuminate; nostrils basal, rounded, partly concealed by reflected bristles; tongue short, horny; three toes before, the exterior joined at its base to the middle one; hind toe very long, with a long hooked claw; tail composed of twelve feathers.

The species of this genus are climbers, and differ from the woodpeckers in being able to ascend or descend the trunks of trees with equal facility. They feed chiefly on insects and their larvæ; sometimes on nuts and seeds.

S. Europæa, Lin. Nuthatch. Plumage plumbeous above, sub-ferruginous beneath; a black streak across the eyes; lateral tail feathers black, whitish near the tips; breast and belly buff orange. $5\frac{1}{2}$ inches long. Inhabits Europe.—*Selby*, *Illust.* pl. 39, fig. 1.

S. Caroliniensis, Lath. Black-headed Nuthatch. Plumage cinereous above, whitish beneath, with the lower part of the abdomen inclining to rufous; head and upper part of the neck black, and the tail-feathers varied with black and white. Inhabits America.—*Wilson's Amer. Orn.* i. pl. 2, fig. 4.

Gen. 3. ORTHONYX, Lin. Tem.

Bill very short, compressed, almost straight, point notched; nostrils in the middle of the bill, open, surmounted by bristles; tarsus longer than the middle toe; claws longer than the toes, furrowed laterally; wings very short; tail long, pointed.

O. maculatus, Tem. Plumage dull brown above, spotted with black; male with a red throat, edged with black; throat of the female white. Inhabits Australasia.—*Tem. Man.* lxxxii.

Gen. 4. DENDROCALAPTES, Herman.

Bill depressed and trigonous at the base, straight or slightly bent, acute; nostrils basal, lateral, pierced in the bill; tongue short, cartilaginous; tail conical, the feathers stiff and acuminate; external toe united to the intermediate to the second joint, the internal very short; claws hooked and furrowed.

All the species of this genus inhabit South America. They resemble each other greatly in the plumage, but differ widely in the length and form of the bill. A Monograph of the genus by Lichtenstein appeared in the Berlin Transactions for 1820.

D. procurvus, Tem. Head, neck, and scapulars olive-brown, striped with white; wings and tail rufous; body beneath olive-brown, with whitish stripes; bill reddish, curved. Inhabits Brazil.—*Tem. Pl. Col.* 28.

D. longirostris, Illig. Bill elongated, slightly bent, stout, compressed, white; throat white. Brazil.—*Berl. Trans.* 1820, 200.

D. falcistrostris, Spix. Plumage cinnamon-coloured above, beneath and vent olive-brown, striped with white; head and neck striped with white; bill greatly compressed, ash-coloured. $10\frac{1}{2}$ inches long. Inhabits Brazil.—*Spix, Avium Nov. Sp.* pl. 88.

D. miniatus, Illig. Bill slightly bent, compressed, black; mandible white; tail and edges of the quills vermilion red.—*Berl. Trans.* 1820, 202.

Gen. 5. XENOPS, Illig.

Bill short, slender, much compressed, subulate, acute; tips of the mandibles recurved; nostrils basal, lateral, covered by a naked membrane; lateral toes equal; external toe united to the second joint; claws strong, compressed, bent, tail wedged.

X. genibarbis, Tem. Plumage reddish-brown above, gray-brown below; chin, eyebrows, and spots on the throat and breast whitish, a snowy spot beneath the ears; lesser quills blackish, with rufous margins. $4\frac{1}{4}$ inches long. Brazil.—*Shaw*, xiv. pl. 22.

X. anatoboides, Tem. Red-brown, with the throat, collar on the nape of the neck, and line behind the eyes to the occiput white; tail red. 7 inches long. Brazil.—*Tem. Pl. Col.* 150, fig. 2.

X. rutilans, Tem. Back and wings olive, quills golden yellow at the base, black in the middle, with red tips; throat and lines on the neck white. $4\frac{1}{2}$ inches long. Brazil.—*Tem. Pl. Col.* pl. 72, fig. 2.

Gen. 6. ANABATES, Tem.

Bill straight, shorter than, or the length of the head, compressed, deeper at the base than broad, a little bent at the tip, entire; nostrils basal, lateral, oval, partly covered by a plumose

membrane; tarsus longer than the middle toe; the exterior toe united to the second joint, the interior at the base; wings short; tail with weak shafts.

A. Guianensis, Tem. Plumage gray above; wings and tail rufous; under parts white; tail very long. $6\frac{1}{2}$ inches long. Inhabits Guiana.—*Shaw*, x. 678.

A. striolatus, Tem. Plumage above brown, with longitudinal red-brown stripes; chin and tail red; cheeks, sides of the neck, and body below olive-brown, longitudinally striped with white. 7 inches long. Inhabits Brazil.—*Tem. Pl. Col.* 238, fig. 1.

Gen. 7. OPETIORHYNCHOS, Tem.

Bill longer than the head, slender, subulate, depressed at the base, compressed at the point; tongue short, cartilaginous; nostrils lateral, a little from the base, half shut by a naked membrane; tarsus twice longer than the middle toe; lateral toes equal, the exterior united at the base; wings short, the first three feathers graduated, the third and fourth longest; tail short, slightly graduated.

O. rufus, Tem. (*Merops*, Lath.) Plumage rufous, deepest on the upper parts, and inclining to paler yellow beneath; large quill-feathers brownish; tail slightly rounded at the end. $8\frac{1}{2}$ inches long. Inhabits S. America.—*Shaw*, viii. 182.

Gen. 8. CERTHIA, Lin.

Bill long, or of mean length, more or less curved, triangular, compressed, slender; nostrils basal, naked, pierced horizontally, and half closed by a membrane; three toes before, the outer united at its base to the intermediate one; claws much hooked, that on the hind toe longest; tail graduated, with stiff-pointed shafts; fourth quill-feather longest.

The birds of this genus climb trees like the Woodpeckers, supporting themselves by the stiff-pointed feathers of the tail. They nestle in the chinks and holes of trees, and feed principally on small insects and seeds. Only one species is indigenous to Europe.

C. familiaris, Lin. Common Creeper. Plumage above yellowish-brown, intermixed with black brown and grayish white; rump reddish; a white streak above the eyes; throat, breast, and belly white; tail yellowish-gray, tinged with brown, the feathers stiff, long, and acuminate. $5\frac{1}{4}$ inches long. Inhabits Europe. B.—*Selby, Illust. pl.* 39, fig. 2.

C. cinnamomea, Lath. Cinnamon-coloured above, tips of the quill-feathers blackish; white beneath, with subcuneated tail, the feathers pointed. 5 inches long.—*Shaw*, viii. 224.

Gen. 9. CÆREBA, Briss.—*Certhia*, Lin.

Bill slightly arcuated, thick at the base; edges of the mandibles

bent inwards, points sharp ; upper mandibles finely notched at the point ; tongue long, not extensible, bifid, filamentous ; tarsus longer than the middle toe ; lateral toes equal ; tail of medium size.

C. cyanea, Tem. Plumage ultra-marine blue ; crown of the head pale green ; tail and outer sides of the wings black, with oblique blue band on the wings ; insides of the wings yellow. $4\frac{1}{2}$ inches long. Inhabits Brazil—*Shaw*, viii. pl. 32.

C. spiza, Tem. Plumage green, with the under parts, wings, and tail tinged with blue ; crown and cheeks black. 5 inches long. Inhabits S. America—*Edw.* pl. 25.

Gen. 10. TROCHILUS, Lin.

Bill long, straight or arcuated, tubular, very slender, base depressed, acuminated ; upper mandible almost concealing the lower ; tongue long, extensible, bifid, and tubular ; nostrils open before, covered by a broad membrane ; legs very short ; tarsus shorter than the middle toe ; the three anterior toes nearly divided ; wings graduated, the first feather longest.

The birds of this family are of very small dimensions, and, with a very few exceptions, inhabit the southern regions of America. They fly very rapidly, take their food on the wing, and suck the honied juice of flowers. They construct an elegant hemispherical nest of the down of a species of *Thapsus*, and suspend it over branches of trees, where it is concealed by the leaves, the female laying two white eggs of the size of peas. The male assists in incubation. The unrivalled brilliancy of their colours has been aptly compared to the richest metallic hues, or to the changeable reflections of gems, and in sunshine they glow with peculiar splendour. This numerous genus has been divided by some naturalists into those with curved, and those with straight bills ; and by others as their tail is more or less forked, square, or rounded.

T. pella, Lin. Topaz-throated Humming-Bird. Plumage purple-red, with black head, topaz-coloured throat, and the two middle tail-feathers very long. Body equal in size to that of a wren, but including the middle tail-feathers 8 to 10 inches long. Inhabits S. America.—*Shaw*, viii. pl. 37

T. sparganurus, Shaw. Bar-tailed Humming Bird. Plumage golden green, with emerald-coloured throat, black forked tail, and a crimson gold bar across the feathers. $3\frac{1}{2}$ inches long ; two long tail-feathers $4\frac{1}{2}$ inches. Peru.—*Shaw*, viii. pl. 39*.

T. enicurus, Tem. Jugulum, lower part of the breast at the side and chin golden green ; neck in front at the base, breast above, and belly in the middle white ; throat lilac ; six tail-feathers, the two middle golden green, the others black.—*Shaw*, xiv. pl. 28.

T. jugularis, Lin. Red-breasted Humming-Bird. Plumage above deep golden green ; throat and breast blood-red ; abdomen blackish, and short tail. $4\frac{1}{2}$ inches long. S. America.—*Edw.* pl. 266.

T. squalidus, Natterer. Plumage obscure brownish, sides of the head with two reddish white bands ; a brown stripe through the eyes ; back with a metallic tinge ; breast reddish ash-coloured ; vent red ; quills white at the tip. Brazil.—*Tem. Pl. Col.* 120, fig. 1.

Gen. 11. NECTARINIA, Illig.—*Certhia*, Lin.—*Cinnyris*, Cuv.

Bill long, slender, subulate, more or less bent, widened and depressed at the base; mandibles equal; edges of the under mandible bent inwards, and in part concealed by the upper; tongue long, extensible, tubular, bifid; nostrils near the base, lateral, shut above by a naked membrane; tarsus longer or as long as the intermediate toe, the lateral toes united at the base; wings, first feather none or very short, the third and fourth the longest.

All the known species of this genus belong to the warmer parts of the Old Continent. They do not climb, but hop from flower to flower, exploring the nectary for food.

N. chalybea, Tem. Head, neck, breast, smaller wing-coverts, and back golden green; wings and tail dusky brown; breast red, banded above by a steel-blue bar. $4\frac{1}{2}$ inches long. Inhabits Southern Africa.—*Shaw*, viii. pl. 28.

N. Javanica, Tem. Head above, nape, and back deep olive green; shoulders and rump glossy violet; wings and cheeks olive brown; throat and jugulum rust-coloured; breast and abdomen saffron colour; tail black. $4\frac{1}{2}$ inches long. Java.—*Lin. Trans.* xiii. 167.

N. longirostra, Tem. Plumage blackish olive; crown and nape pale green; throat and breast white; abdomen yellowish. 5 inches long; bill $1\frac{1}{2}$ inch long. Bengal.—*Tem. Pl. Col.* 84, fig. 1.

N. pectoralis, Tem. (*N. eximia*, Horsf.) Top of the head and tail deep glossy emerald green; two middle tail-feathers elongated; rump yellow; throat and breast scarlet; a band of purple on the throat; belly olive brown. $4\frac{1}{2}$ inches long. Inhabits Java.—*Tem. Pl. Col.* 138, fig. 3.

Gen. 12. CLIMACTERIS, Tem.

Bill short, much compressed, awl-shaped; mandibles equal, pointed; nostrils covered by a naked membrane; tarsus the length of the middle toe, which, with the thumb, is very long; claws large and hooked, furrowed on the sides; exterior toe united to the second joint, the anterior to the first; third and fourth wing-feathers longest.

C. scandens, Tem. Plumage above deep brown; rump and two middle tail-feathers lead-coloured; throat and neck in front white; breast and belly cream yellow; sides and under tail-coverts varied with brown and white; wings brown, with two transverse bands. $5\frac{3}{4}$ inches long. New Holland.—*Tem. Pl. Col.* 281, fig. 2.

C. picumnus, Tem. Plumage brown above; throat and cheeks whitish; breast, top of the head, and neck gray; wings brown, with a transverse yellowish band. $6\frac{1}{2}$ inches long. Inhabits New Holland, &c.—*Tem. Pl. Col.* 281, fig. 1.

Gen. 13. TICHODROMA, Illig.—*Certhia*, Lin.

Bill very long, slightly arched, slender, cylindrical, angular

at the base, tip depressed; nostrils basal, naked, half shut by an arched membrane; the exterior toe joined at its base to the middle one; claw on the hind toe very long; tail rounded, with weak shafts.

There is only one species of this genus, which climbs the vertical faces of rocks as the common creeper does the surface of the trunks of trees. It nestles in the clefts of rocks and feeds on insects.

T. phænicoptera, Tem. (*Certhia muraria*, Lin.) The Wall-Creeper. Top of the head deep ash-colour; back and scapulars lighter; throat and fore part of the neck black; wing-coverts and upper part of the exterior webs of the quills red; tail black, terminated with white and ash-colour. $6\frac{1}{2}$ inches long. Inhabits Southern Europe.—*Shaw*, viii. pl. 25.

Gen. 14. UPUPA, Lin.

Bill very long, slightly arched, slender, triangular, compressed; nostrils basal, lateral, ovoid, open, and surmounted with feathers in front; three toes before, the exterior united to the middle one to the first joint; one behind; tail square, of ten feathers.

U. epops, Lin. The Hoopoe. Head with two rows of reddish feathers terminated with black, forming an arched tuft; body ferruginous; wings black, with five white bands; tail black, with a lunated white band. 11 inches long. Inhabits Europe.—*Selby*, *Illust.* pl. 40. fig. 2.

This beautiful bird inhabits Europe, Asia, and Africa, in the last of which many of them are stationary. Some of the migrating detachments visit Britain occasionally in autumn, but they seldom breed in this country. In France they arrive late in spring, and depart towards the close of summer,

U. Madagascariensis, Shaw. Plumage above dusky brown, deepest on the wings and tail; crest and under parts white. 10 inches long. Inhabits Madagascar.—*Shaw*, viii. 140.

Gen. 15. EPIMACHUS, Cuv.

Bill much longer than the head, slender; more or less arcuated, compressed; mandibles pointed, the upper one slightly notched at the point, and longer than the lower; gape extending to under the eyes; tongue short, cartilaginous; nostrils basal, lateral, open before, half shut by a feathered membrane; legs short; tarsus longer than the middle toe; the external toe united to the first joint; fourth and fifth wing-feathers longest.

E. superbus, Tem. (*Promerops*, Shaw.) Plumage black, with a violet and green gloss; scapulars falciform, purplish black on the inner web, brilliant golden green on the edges and tip; on each side below the wings loose-webbed, pendant brownish feathers; tail very long. 4 feet long. Inhabits New Guinea.—*Shaw*, viii. 145.

E. erythrorhynchos, Tem. (*Upupa*, Lath.) Plumage black, with a green and purple gloss ; bill and legs red ; tail very long, all the feathers, except the two middle ones, marked near the tip by an oval white spot on each side of the web. 15 inches long. Inhabits Africa.—*Shaw*, viii. pl. 18.

Gen. 16. DREPANIS, Tem.—*Certhia*, Lath.

Bill very long, rounded above, thick and triangular at the base, subulate at the point ; upper mandible longer than the under ; tongue short, cartilaginous ; nostrils half closed above ; tarsus twice as long as the middle toe ; the lateral toes equal ; wings with the third, fourth, and fifth feathers longest.

D. Pacifica, Tem. General colour black, with rump, lower part of the belly, and thighs bright yellow ; spurious wing yellowish white ; bill greatly curved, brownish black. 8 inches long. Inhabits South Sea Islands.—*Shaw*, viii. 227.

D. vestiaria, Tem. General colour bright scarlet, with the wings and tail black ; tail-feathers slightly pointed at their extremities ; bill stout, considerably curved ; pale yellow. 6 inches long. Inhabits Sandwich Islands.—*Shaw*, viii. pl. 33.

Gen. 17. MELIPHAGA, Lewin.—*Philedon*, Vieill.

Bill of the length of or shorter than the head, compressed, rather arcuated, emarginate towards the tip, acute ; nostrils lateral, ovoid, covered by an arched membrane ; tongue long, extensible, terminated by cartilaginous filaments ; toes, the external united to the second joint, the internal to the first ; back toe very strong, long.

This genus is very numerous in species.

M. cyanops, Tem. (*Merops*, Lath.) Blue-faced Honey-Sucker. Plumage brown above, white beneath ; crown and throat black ; eyes surrounded by a blue patch ; bill black ; legs blue. 16 inches long. Inhabits New Holland.—*Lewin's New Holl. Birds*, pl. 25.

M. Phrygia, Tem. (*Merops*, Lath.) Plumage black, elegantly variegated with bright and pale yellow ; a granulated naked yellow skin round the eyes ; back and breast undulated by numerous pale or whitish yellow crescents. Size of a thrush. Inhabits New Holland.—*Shaw*, viii. pl. 20.

ORDER VII.—ALCYONES.

Bill middle sized or long, pointed, almost quadrangular, and either slightly arched or straight ; tarsus very short ; three toes before, united, and one behind.

The birds of this order, instituted by Temminck, fly with great celerity. Their movements are quick and abrupt, and they neither walk nor climb. They seize

their food on the wing, and often from the surface of water, and nestle in holes on the banks of rivers. They moult only once a-year; and the females and young are not very dissimilar from the males and mature birds.

Gen. 1. MEROPS, Lin.

Bill sharp-edged, pointed, slightly curved; nostrils basal, lateral, ovoid, concealed by hairs directed forwards; tarsus short; three front toes united, the exterior to the second joint, the interior to the first joint of the middle toe; hind toe broad at its base; the second wing-feather the longest.

This genus feeds chiefly on bees and wasps, which they seize on the wing. They nestle in holes on the banks of rivers. Many of the exotic species have their nostrils entirely naked, and the third wing-feather the longest.

M. apiaster, Lin. Common Bee-eater. Forehead greenish white; occiput, nape, and top of the back chestnut; rest of the body reddish yellow; middle of the wing deep red; wing and tail-feathers olive-green; eye-stripe black; throat golden yellow, with a black semicollar; two middle tail-feathers elongated and acuminate. Inhabits Europe. B.—*Selby, Illust.* pl. 41.

M. Savignii, Swainson. Green Bee-eater. Plumage green, beneath whitish; rump and tail blue; crown of the head, eye-stripe, and broad band across the neck black; chin and eyebrows white. $8\frac{1}{2}$ inches long. Inhabits Africa.—*Zool. Illust.* pl. 76.

M. gularis, Shaw. Red-throated Bee-eater. Plumage black; forehead and rump blue; abdomen spotted with blue; throat red; tail even at the end. Inhabits Africa.—*Shaw*, viii. pl. 23.

Gen. 2. ALCEDO. Lin.

Bill long, straight, quadrangular, pointed, edged, and very rarely depressed; nostrils basal, lateral, pierced obliquely, almost wholly closed by a naked membrane; legs short, naked above the knee; exterior toe united to second joint, and the interior to the first joint of the middle toe.

The birds of this genus are dispersed over the whole world, although only one species is found in Europe. They are more remarkable for brilliancy of plumage than elegance of shape. Their prevailing colours are blue, green, and orange. Their flight is horizontal, and, notwithstanding the shortness of their wings, remarkably strong and rapid. Most of them frequent rivers, and the vicinity of waters, and live on fish, which they catch with singular art and dexterity, sometimes hovering over the stream, when a shoal of small fishes is seen playing near the surface, at other times waiting with attention on some low branch the approach of a single one, which may happen to move in that direction, and in either case darting with rapidity on their prey. The Kingfishers may be divided into two sections, as the tail is short or elongated.

A. ispida, Lin. The Kingfisher. Upper parts bluish green, marked on the head and coverts of the wings with little spots of azure blue; back and rump blue; a red patch of orange brown, concealed by a white one, behind each eye; a streak of azure blue from the bill to the wings; throat and neck white; lower parts reddish. 7 inches long. Europe. B.—*Selby, Illust.* pl. 40, fig. 1.

This species is the Halcyon of the ancients, which the poets feigned as occupying a floating nest, and calming adverse winds and stormy seas.

- A. *biru*, Tem. Plumage above azure-blue ; wings externally brown ; throat, jugulum, abdomen, and vent white ; bill and legs black. $5\frac{1}{2}$ inches long. Inhabits Java.—*Tem. Pl. Col.* 239, fig. 1.
- A. *cæruleocephala*, Lin. Plumage above blue, rufous beneath ; the crown undulated with black ; breast white ; bill and legs red. 4 inches long. Inhabits Madagascar.—*Shaw*, viii. pl. 9.
- A. *cristata*, Lin. Crown of the head with long blue green feathers, varied with black lines ; back, rump, wings, and tail ultra-marine blue ; fulvous beneath, with whitish throat and vent. $5\frac{1}{2}$ inches long. Inhabits Africa.—*Shaw*, viii. pl. 12.

Gen. 3. DACELO, Leach.—*Alcedo*, Lin.

- Bill thick, strong, four-sided conical ; mouth gaping to the eyes ; upper mandible longest, broadly notched towards its point on each side ; nostrils oblong, half shut by a feathered membrane ; tarsus shorter than the middle toe ; the external toe united to the third joint, the internal to the second ; wings of medium size.
- D. *gigantea*, Tem. Plumage brownish above ; feathers of the head elongated ; whitish beneath, with black undulations ; wing-coverts and rump pale sea-green, and the tail crossed by numerous black bars. 18 inches long. New Holland.—*Shaw*, xiii. pl. 43.
- D. *pulchella*, Horsfield. Sea green, fasciated with white and dusky above ; head chestnut brown, the vertex azure ; throat and jugulum whitish ; abdomen dilute ferruginous. 8 inches long. Inhabits Java.—*Tem. Pl. Col.* 277.

ORDER VIII.—CHELIDONES.

Bill very short, much depressed, and very wide at the base ; the upper mandible curved at the point ; legs short ; three toes before, either entirely divided, or connected at the base by a short membrane, the hinder often reversible ; claws much hooked ; wings long.

The flight of these birds is rapid and abrupt, their sight piercing, neck short, throat wide, bill broad, and often gaping for the reception of insects, which constitute their only food.

Gen. 1. HIRUNDO, Lin.

Bill short, triangular, broad at the base, depressed, cleft near to the eyes ; upper mandible slightly hooked at the tip ; nostrils basal, oblong, partly closed by a membrane, surmounted by feathers in front ; legs short, with slender toes and claws ; three toes before, the exterior united to the first joint of the middle one ; one behind ; wings long, the first quill the longest ; tail of twelve feathers, mostly forked.

The Swallow tribes manifest a predilection to the neighbourhood of water, and

those situations in which insects most abound. These last they seize with great promptitude in their long sustained and very rapid flights. They catch their food, drink, and bathe, as they glide smoothly and nimbly along the surface of the water. Their motions are easy, swift, and graceful ; and, when not occupied with breeding or sleep, they are almost incessantly on the wing. Their nests are hard and rough on the outside, but furnished with soft materials within. Their migrations are no longer matter of doubt ; and the observations of M. Natterer of Vienna have established the important fact that they moult in February, which is a fresh argument against their alleged torpor in winter.

H. rustica, Lin. Chimney Swallow. Forehead and throat brown chestnut ; sides of the neck and a broad band on the breast black, with violet reflections ; a large white spot on the interior web of the tail-feathers, with the exception of the middle ones ; exterior wing-feather on each side longer than the others ; belly and abdomen dirty white or reddish. $6\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 42. fig. 1.

This well known species occurs almost everywhere in the old continent. It visits us earlier in the season than any of its congeners, usually, if the weather be mild, about the beginning of April, or a week before the House Martin, and it retires about the end of September, or beginning of October. Previous to their departure, the chimney swallows congregate in flocks of three or four hundred, on houses or trees, and usually steal off in the night, to avoid the birds of prey, which seldom fail to harass them in their route. On such occasions their progress is always in a southerly direction, availing themselves as much as possible of favourable winds ; and when no obstacles interfere, they usually arrive in Africa in the first week of October.

H. urbica, Lin. The Martin. Head, neck, and top of the back black, with violet reflections ; wings, tail, and larger coverts black ; tail forked ; lower parts and rump white, tarsi and toes covered with downy feathers. 5 inches long. Inhabits Europe.—B. *Selby*, *Illust.* pl. 42. fig. 2.

Their first annual appearance in this island is about the 16th of April, and they leave us the latest of their tribe, in general about the beginning of October, although some have been known to remain till the 6th of November. According to Mr White, many more leave this country than return to it in spring ; but such as revisit their native seats, find their way back again to their own nests, as has been ascertained by tying coloured threads or brass wires to their legs.

H. riparia, Lin. Sand Martin. Upper parts, cheeks, and pectoral band dark brown ; wings olive brown, inclining to blackish ; throat, belly, and upper tail-coverts white ; tail forked ; tarsi and toes naked, except a few small feathers at the insertion of the hind toe. 5 inches long. Europe. B.—*Selby*, *Illust.* pl. 42. fig. 33.

H. rupestris, Lin. Upper parts clear brown, the wings a little deeper ; lower parts dirty white, tinged with reddish on the sides ; tarsi furnished with a grayish down ; tail with feathers of equal length, the two middle feathers without spots, the others with a large oval white spot. 5 inches long. Inhabits Southern Europe. —*Tem. Man.* 430.

H. leucoptera, Lath. White-winged Swallow. Crown and upper parts of the body cinereous, with blue and green reflections ; greater coverts and secondary quills variegated with white ; primary quills and tail brown ; rump and under parts white. 5 inches long. Inhabits Guiana.—*Shaw*, x. pl. 13.

- II. *Senegalensis*, Lin. Plumage black, shining with blue ; beneath and rump rufous ; quills and tail-feathers black. $8\frac{1}{2}$ inches long. Inhabits Senegal.—*Shaw*, x. 93.

Gen. 2. CYPSELUS, Illig.—*Hirundo*, Lin.

Bill very short, triangular, broad at the base, inconspicuous, depressed ; gape as far as under the eyes ; upper mandible hooked at the tip ; nostrils cleft longitudinally, at the upper part of the bill, open, and the raised margins furnished with small feathers ; legs very short, with the four toes directed forwards, and quite divided ; the toes and claws short and thick ; wings very long ; tail with ten feathers.

The birds of this genus present many analogies with the preceding. They are even more active and unwearied in their movements, and their flight seems to be continuous, and with but little motion of their wings. They are rarely seen to rest even upon elevated places, and never on the ground.

- C. *alpinus*, Tem. (*Hirundo Melba*, Lin.) White-bellied Swift. Grayish brown above, with the throat and belly white ; legs covered with brown feathers. $8\frac{1}{2}$ inches long. Europe.—*Shaw*, x. 74.

- C. *murarius*, Tem. (*Hirundo apus*, Lin.) The Swift. Throat of a white ash-colour ; rest of the plumage blackish brown ; tarsi covered with small feathers ; bill black. $7\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl. 42, fig. 4.

- C. *comatus*, Tem. Plumage of a copper-green, with the wing-coverts, quills, and tail-feathers green ; a line above and beneath the eyes, and tip of the greater wing-coverts white. 6 inches long. Inhabits Sumatra.—*Tem.* *Pl. Col.* 268.

- C. *longipennis*, Tem. Green black above ; with the quills and tail obscure ; back grayish on the lower parts ; body beneath ash-coloured. $8\frac{1}{2}$ inches long. Inhabits Java.—*Tem.* *Pl. Col.* 83. fig. 1.

Gen. 3. CAPRIMULGUS, Lin.

Bill slightly curved, very small, and depressed at the base ; mouth extremely wide ; nostrils basal, wide, closed by a membrane surmounted by feathers ; tail round or forked, of ten feathers ; legs short, the anterior toes united to the first joint ; middle claw long, and serrated on the edge, but smooth in some of the foreign species ; hind toe reversible.

This genus has its name from the ancient but erroneous notion of the species sucking the teats of the she-goat. They are shy and solitary, come forth chiefly in the evening, prey on nocturnal moths and insects, and lay their eggs on the ground. Their eyes and ears are large, like those of the owl.

- C. *Europæus*, Lin. European or Nocturnal Goatsucker. Upper parts varied with black, cinereous, brown, rust-colour, and white, under parts reddish-white, with brown bands ; legs short, scaly, and feathery below the knee. The male is distinguished by a large, oval, white spot, near the end of the first three quill-feathers, and another on the outer tail-feathers 10 inches long. Inhabits Europe. B.—*Selby*, *Illust.* pl 42*

In Britain the Goatsucker is only a summer visitant, arriving about the end of May, and departing in September. Its winter retreat is supposed to be Africa and Asia.

C. ruficollis, Tem. Head, back, and wings clear gray, varied with black points and zigzag lines; a large red collar round the nape, shading into white before; two lateral feathers of the tail terminated by a white spot. 12 inches long. Inhabits Europe.—*Tem. Man.* 438.

C. grandis, Lath. (*Nyctibius*, Vieill.) Plumage variegated with dusky white, and yellow above, black and white beneath; space round the eyes yellowish; feet white; bill covered with hairs. 2 feet long. Inhabits South America.—*Shaw*, x. 142.

Gen. 4. PODARGUS, Illig.—*Caprimulgus*, Lath.

Bill broader than the head, abruptly acuminate at the tip, deflexed; upper mandible spatuliform, carinated; nostrils linear; wings shorter than the tail; toes separate; claws nearly equal.

P. cornutus, Tem. Head with a tuft of long decomposed feathers, a little above and behind the eyes; bill surrounded with bristles; back and wings red, sprinkled with black; scapulars spotted with white; throat white; tail wedged, red, with undulated lines. 9 inches long. Inhabits Java.—*Shaw*, xiii. pl. 41.

ORDER IX.—COLUMBÆ.

Bill of moderate dimensions, compressed; base of the upper mandible covered with a soft skin, in which the nostrils are perforated, the tip more or less curved; feet with three toes in front, quite divided, and one behind.

This order contains but one genus, but is numerous in species, and these very widely dispersed over the world. Pigeons are generally of an elegant form, of beautiful varying plumage, and gentle manners. They are strictly monogamous, and the female lays but two eggs, which are incubated alternately by both sexes. The young are fed by the parent birds with food from their crop which has undergone maceration. The food of pigeons consists of grain and seeds, rarely fruits. They drink with a continued draught.

Gen. 1. COLUMBA, Lin.

Bill of medium size, straight, compressed, arched, tip curved; base of the upper mandible covered with a soft skin, more or less inflated; nostrils in the middle of the membrane; legs generally red; three toes before, entirely divided, one behind, articulated on the heel; wings with the second quill-feather longest.

C. palumbus, Lin. Ring-Dove or Cushat. Head, cheeks, neck, and lower parts of the back bluish gray; upper parts of the back and wing-coverts deeper; a patch of white on the neck; breast and belly brownish-purple; quills blackish-gray, margined with white;

iris yellowish white. $17\frac{1}{2}$ inches long. Inhabits Europe. B.—*Selby, Illust. pl. 56, fig. 1.*

This species breeds twice or thrice a-year, and is stationary in Britain. Its note is louder and more plaintive than that of the common pigeon, but uttered only in pairing time, or during fine weather. Various attempts to domesticate the Ring-Dove have been made, but without success.

C. œnas, Lin. Stock Dove. Head, throat, wings, and under parts bluish ash-coloured; sides of the neck of a changeable green; breast lavender purple; top of the back brown ash-coloured; a black spot on the last two secondary feathers and some of the coverts of the wings; wings and tail bluish ash-coloured; tail terminated with black; iris brownish red; legs and toes bright red. 13 inches long. Europe. B.—*Selby, Illust. pl. 56*, fig. 1.*

C. livia, Briss. The Rock Dove. Upper parts bluish ash-coloured; sides of the neck changeable green; rump white; two black transverse bands on the wings; wing and tail-feathers terminated with black; lateral tail-feathers margined with white; iris reddish-yellow. 12 inches long. Inhabits Europe. B.—*Selby, Illust. pl. 56*, fig. 2.*

From this species all the domestic varieties are supposed to be derived.

C. turtur, Lin. The Turtle-Dove. Head, neck, breast, and back light wood-brown, tinged with pearl-gray; a patch of black feathers, margined with white, on each side of the neck; scapulars and wing-coverts black, shading into bluish-gray, and deeply edged with buff-orange; belly and under tail-coverts white; two middle tail-feathers brown, the rest with their tips white. 11 inches long. Inhabits Europe. B.—*Selby, Illust. pl. 56, fig. 2.*

This delicate bird is only a periodical visitant in Britain, arriving in the beginning of May, and departing after incubation at the commencement of September. It is only found in the southern counties.

C. lacermulata, Tem. Plumage reddish-brown; head blue ash-coloured; middle of the belly purple; under tail-coverts red; shoulders and wings dusky, shining with bronzed-green; tail dusky at the base. 15 inches long. Inhabits Java.—*Tem. Pl. Col. 164.*

C. scripta, Tem. Plumage above ashy-brown, the wing-coverts sprinkled with opaline green spots; throat white, edged with black; breast and middle of the belly ashy-blue; lateral tail-feathers brown at the base, deep black at the tip. $9\frac{1}{2}$ inches long. Inhabits New Holland.—*Tem. Pl. Col. 187.*

C. lophotes, Tem. Plumage brownish ash-coloured; head with an elongated crest; back and lesser wing-coverts with a transverse black bar towards the tips; the greater coverts with green tips; quills with a purple spot on the outer web; tail-feathers elongated, with white tips. 12 inches long. Inhabits New Holland. *Shaw, xiv. pl. 34.*

C. magnifica, Tem. Plumage above fine golden green; wing-coverts spotted with yellow; head, cheeks, and nape ash-coloured; secondary feathers and quills deep changeable green; throat, ante-

riorly, and upper part of the breast violet-purple; abdomen, thighs, and under tail-coverts ochraceous. 16 inches long. New Holland.—*Tem. Pl. Col.* 163.

C. migratoria, Lin. Migratory Pigeon. Tail cinereous; neck green-golden purple; wings with ovate spots in the middle; breast rufous, and abdomen white. 14 inches long. Inhabits N. America.—*Shaw*, xi. 93.

The Migratory Pigeon of North America exists in immense flocks, which in their excursions sometimes cover a space of two miles in length, and a quarter of a mile in breadth. They travel in the morning and evening, and repose about mid-day in the forests, especially in those which abound in oaks, of the acorns of which they are very fond. Although they always shape their course in the same general direction, they seldom observe the same line of march for two seasons in succession, proceeding sometimes by the maritime, and sometimes by the more inland regions. Their passage, whether in spring or autumn, lasts from fifteen to twenty days, after which they are met with in the centre of the United States. When in the southern districts, they keep always in flocks, but when in the north, they pair, disperse, and nestle in the vast forests of Nova Scotia, Canada, &c. where they commit serious havock on the newly-sown fields. Large quantities are annually killed. An individual of this species was shot in Fife in 1826.

C. coronata, (*Lophyrus*, Vieill.) Great Crowned Pigeon. Body bluish, shoulders ferruginous, with a white band on the wings; orbits black; crest composed of long feathers of a loose texture, erect. Size of a turkey. Inhabits India.—*Shaw*, xiv. pl. 19.

ORDER X.—GALLINÆ.

Bill short, convex, in some genera covered by a cere; upper mandible bending from its base or only at the point; nostrils lateral, covered by a membrane, naked or feathered; tarsus long; three toes before, united at their base by a membrane, hind toe articulated on the tarsus above the junction of the anterior toes.

The birds which form this order are of a bulky and heavy form. The greater number have short wings, which renders them incapable of distant or long-continued flight. Their principal food consists of grain and seeds, though some add to those roots, herbs, and the buds of trees, and most of them devour insects. Their nest is in most cases placed on the ground among bushes or herbage, without much art. Some members of the order are polygamous; others pair every season. Their eggs are numerous, and the young when first excluded are covered with soft down, and are immediately able to follow their parent and feed themselves. They scratch the ground with their feet in search of food, and have the peculiar habit of rolling themselves in the dust. The chief part of our domestic poultry is derived from the birds of this order.

Gen. 1. PAVO, Lin.

Bill naked at the base, convex above, thickened, bent down towards the tip; nostrils open; cheeks partially denuded; tail-coverts very long; tail of eighteen feathers, elongated, broad, capable of being expanded like a fan, and ocellated; tarsus longer than the middle toe, with a conical spur; head crested.

P. cristatus, Lin. Crested or Common Peacock. Crest compressed, body of the male golden green, glossed with brassy reflections above; wing-coverts green gold, with blue and brassy reflexions, under parts of the body dusky, varied with green gold; head with two white stripes on each side; upper tail-coverts very long, with various colourings, and auriferous eyes or arches. 4 feet long. Inhabits India.—*Shaw*.

The Peacock is one of the most beautiful of birds. It is a native of India, but has been domesticated in Europe for many ages. It is a proud and quarrelsome bird, and utters a discordant scream. The female lays from five to six eggs, which are hatched in from twenty-seven to thirty days. The young acquire their perfect plumage in the third year. The food of the peacock is similar to that of the gallinaceous birds. Aged females sometimes acquire the plumage of the male. The brains of peacocks formed a dish in high estimation at the tables of the Roman epicures.

P. muticus, Lin. The Japan Peacock. Body above green blue, with a brassy gloss; beneath ash-coloured, with black spots and white stripes; breast rich blue, glossed with green and gold; upper tail-coverts ocellated; head with an erect spicated crest. Size of the common peacock. Inhabits Japan.—*Shaw*, xi. 148.

Gen. 2. GALLUS, Briss. Tem.—*Phasianus*, Lin.

Bill of medium size, strong, base naked; upper mandible arched, convex, bent towards the point; head surmounted by a crest or plume; ears naked; three toes before, united to the first joint; the hind toe raised from the ground; tarsus with a long and bent spur; middle feathers of the tail arched; wings short.

G. Sonneratii, Tem. (*P. gallus*, Gmel.) The Jungle Cock. Comb toothed, throat wattled beneath, feathers of the neck elongated, spotted with white, black, and fulvous, with membranaceous tips; throat, breast, abdomen, and back, gray, striped with white; wing-coverts reddish-chestnut; quill and tail-feathers deep black. Inhabits India.—*Shaw*, xi. pl. 12.

G. domesticus, Tem. (*P. gallus*, Lin.) Domestic Cock. Comb dentated; throat wattled; feathers of the neck linear and elongated; body variegated with beautiful colours; tail compressed and ascending; comb and wattles of the female less than those of the male.—*Shaw*, xi. 203.

This is the origin of all the domestic varieties of this useful bird, and is supposed to have come originally from Asia. It is spread over the whole world, and the vast varieties in point of colour, comb, feet, feathers, &c. are an exemplification of the power of domestication, food, and climate, in producing and continuing particular breeds or races. The hen lays eggs for nearly the whole year, if properly fed, and kept in a certain temperature. The young are hatched in about three weeks. In domestication few of the race are allowed to live long; but an instance is related of a hen in Cumberland living for thirty years. For the seven previous years, however, she had given over laying eggs. The female in old age sometimes assumes the plumage of the male.

G. furcatus, Tem. The Fork-tailed Cock. Comb entire; throat with a wattle in the middle; feathers of the neck short and rounded; body above green-gold, beneath black; wing-coverts orange and brown; female with comb or wattle. Java.—*Shaw*, xi. 215.

branous filaments, two of which are plumose ; antennæ inserted on the middle of the forehead, tumid toward the extremity, of from twelve to thirteen joints, terminated in a point ; mandibles projecting, forming a kind of beak, sometimes horny in the males ; jaws and lower lip very long, bent ; palpi short, the maxillary ones of four joints, the labial of two.

All the insects of this genus are foreign, and found chiefly in Africa and Asia.

S. cornuta, Lat. Reddish brown, with a spot on the back ; wings and abdomen black ; mandibles in both sexes with a projection or branch, forming a kind of horn. Africa.—*Lat. Gen.* iv. 135.

2. SOCIALES.

Gen. VESPA, Lin. Lat.

Labium straight, in three parts, of which the intermediate is nearly cordiform, slightly elongated, with four glandular points at the extremity ; maxillary palpi of six joints, labial of four, the greater part short, obconical ; mandibles scarcely longer than broad, obliquely and broadly truncated at the end ; hood almost square, with the middle of the anterior margin truncated and unidentate on each side ; abdomen ovoid, conical, and truncated before at the base.

The Wasps, like the bees, live in society, and are, like these insects, remarkable for their industry and the structure of their common dwellings. But the bee gathers its food solely from flowers, its sting being only used as a defensive weapon against the attacks of its enemies, while in the wasp the sting is an offensive arm, calculated for its predatory and ferocious course of life. Among the insects of this genus may be remarked the Hornet, which forms its dwelling in the holes of old walls or the hollows of decayed trees. In this last case, these insects enlarge the cavity by detaching the fragments of the decayed wood. The females particularly, having passed the winter in torpidity, on the approach of the warm season, seek a place for the establishment of the colony, and begin the operation by building a thick and solid pillar of the same substance as the other parts of the nest, but much harder and more compact. The matter of which this is formed consists generally of the bark of the ash, detached in filaments, and ground by their mandibles into a kind of paste, which hardens as the work goes on. This post or pillar is always placed in the most elevated place of the vault, and attached to it is a kind of cap or roof of the same material, which protects their combs from above. Within this vault they place a second column, in some respects a continuation of the first, which forms the base of the first row of the cells of the comb. These cells are hexagonal, and their openings turned downwards. As in spring only female wasps are seen, it is conjectured they have been fecundated before winter, for they commence depositing their ova as soon as the cells are ready. These ova are soon hatched, and when the larvæ have acquired sufficient size, they line their cell with a silky substance, and in this covering undergo their metamorphosis. When this is completed they leave the cell in their perfect state. The insects which first appear are the workers ; and analogy has led to the belief, that these are, as in the bees, females destitute of ovaries. These occupy themselves in the construction of the dwelling and in the feeding of the larvæ. The female continues to deposit her ova ; the family increases in numbers ; the envelope of the comb is enlarged ; and when this is completed a new addition of pillars is formed connected with the first, till the whole cavity is filled except an entrance about an inch in diameter. Towards the beginning of autumn, the young males and females acquire their perfect form ; and all the larvæ which have not completed their transformation before October perish from cold and want of food, for the wasps cease to feed them after this period, and even throw them out of the nest. The males and neuters perish daily, so that toward the end of winter there remain only the fe-

males, destined to keep up the race by the formation of new colonies, who have passed this season in torpidity.

The Common Wasp makes its nest in the ground, generally about six inches deep, with an entrance of about an inch in diameter. It is of a circular form and about thirteen inches in diameter. The envelope is of a grayish colour, papyraceous consistence, and sometimes nearly an inch in thickness, with two round holes for entrances. The interior is occupied by many parallel and nearly horizontal combs, resembling those of the bees in form, but of different material. These combs, to the amount sometimes of fifteen or sixteen, are arranged in stages with intervals between them, and supported in these intervals by a kind of columns. The edifice is begun at the top and increased downwards. The community is formed of males, females, and workers or neuters, the last of which, as among the bees, do all the work. These are continually on the wing in search of food, destroying fruits, provisions, and even carrying smaller insects bodily to their nest. A nest full of combs generally contains fifteen or sixteen thousand cells, of which each contains an ovum or a pupa; and the larvæ are fed as the small birds feed their young, by the food brought to the hive, after being macerated in the mouth of the mother. About twenty days after the ova have been deposited, the larvæ are ready for their metamorphosis into pupæ. These, inclosed in their cells, become perfect insects in the course of eight or nine days after, and the cells, then cleared out by the industrious community, are fit for the reception of ova for a new race. Like the Hornets, the greater part of the species perish in autumn. Some females, destined to perpetuate the species, pass the winter in torpidity; and in the following spring, each becomes the founder of a new republic, of all the individuals of which she is the mother. The neuters, as being most useful, are first hatched, the males and females not appearing till towards the end of summer and the commencement of autumn. The males are smaller than the females and larger than the neuters, and, like the same class among the bees, are destitute of a sting. The inflammation and swelling arising from the sting of the wasp is more violent than that produced by the sting of bees.

V. crabro, Lin. Lat. The Hornet. Antennæ obscure, with the base ferruginous; head ferruginous, pubescent, with the upper lip yellow; mandibles yellow at the base, and black at the extremity; thorax black, pubescent, with the anterior portion brownish; first segment of the abdomen black, with the base ferruginous, and the margins yellowish; the other segments black at the base, yellow at the extremity, with a small black lateral point on each; feet brownish, and wings with a reddish tint. About an inch long. Europe, inhabiting hollows in old trees.—*Shaw*, vi. pl. 95.

V. vulgaris, Lin. The Common Wasp. Antennæ and head black, with the upper lip and around the eyes of an obscure yellow; mandibles yellow, black at the extremity; thorax black, slightly pubescent, with a spot before the wings, a callous point at their origin, a spot below and four on the scutellum yellow; abdomen yellow, with the base of the segments black, and a distinct black point on each side, the first segment with a black lozenge shaped spot in the middle, the spot on the others almost triangular; feet brownish yellow, with the base of the thighs black. 6 to 9 lines long. Inhabits Europe, living in society, and making its nest under ground.—*Shaw*, vi. pl. 95.

TRIBE II.—MASARIDES, Lat.

Antennæ with from eight to ten joints, and terminated in a rounded button; labium terminated by two filaments, retiring into a tube formed by the base; two cubital arcolæ, of which the second receives two recurrent nerves.

Gen. MASARIS, CELONITES.

Gen. MASARIS, Lat. Fab.

Females with a sting ; eyes notched ; upper wings folded longitudinally in repose ; abdomen appearing sessile, elongated ; antennæ as long as the head and thorax, of eight joints, of which the last is clavate.

M. vespiformis, Fab. Antennæ in the male long ; labrum triangular, longer than broad ; mandibles with four distinct teeth ; maxillary palpi of four joints ; abdomen long and semicylindrical. Inhabits Africa.—*Lat. Gen. iv. 144.*

FAMILY VI.—MELLIFERA, Lat.

All the individuals with extended wings ; first joint of the posterior tarsi large, compressed, square or triangular, and generally furnished with a tuft of hairs proper for collecting the pollen of flowers ; jaws and lip generally long and narrow, forming a proboscis ; chin elongated, and supported on a moveable pedicle ; labium in the greater number lanceolate or filiform, long and hairy.

The larvæ of the insects of this family are fed with the pollen of flowers and honey. Many live in societies, composed of three kinds of individuals, as in the preceding family, some of these temporary and others persistent. In the last of these the neuter labour for the whole.

TRIBE I.—ANDRENETÆ, Lat.

Intermediate division of the labium sometimes widened in a heart-form, sometimes lanceolate, and in both cases shorter than the sheath or chin, almost straight, or simply folded upwards ; jaws and lip long, forming a kind of proboscis bent downwards.

The insects of this tribe are solitary, and each species consists of but two kinds of individuals. They collect the pollen of flowers by means of the hairs on their feet.

I. Intermediate division of the labium nearly heart-shaped.

Gen. HYLÆUS, COLLETES.

II. Intermediate division of the labium lanceolate, but rarely almost linear

1. Intermediate division of the labium folded upwards in repose.

Gen. DASYPODA, ANDRENA,

2. Intermediate division of the labium almost straight, advanced or bent inferiorly ; three complete cubital cells.

Gen. SPHECODES, HALICTUS, NOMIA.

Gen. ANDRENA, Fab. Lat.—*Apis*, Lin.—*Melitta*, Kirby.

Intermediate division of the labium lanceolate, folded upwards in repose ; jaws simply bent near their extremity ; all the legs longer than the first joint of the tarsi ; three cubital areolæ in the wings of the greater number, of which the second and third receive a recurrent nerve ; body oblong and hairy ; abdomen depressed.

A. cineraria, Lat. Black, with whitish hairs on the head and tho-

rax ; a black transverse band in the middle of the thorax ; abdomen almost naked, of a bluish black colour ; extremities of the wings blackish. Europe, on flowers.—*Nouv. Dict.* i. 500.

TRIBE II.—APIARIÆ.

Intermediate division of the labium filiform or setaceous, as long or longer than the sheath, bent downwards, as well as the extremity of the jaws, at the insertion of the palpi ; jaws and lip forming a long proboscis, folded downwards and upon itself in repose ; labial palpi compressed, in the form of scaly filaments.

The Apiariæ are distinguished from the other Hymenopterous insects by the elongation of their jaws and lip in the form of a slender proboscis, terminating generally in a downy or silky point of the labium. This last part, at the point where it leaves its semitubular sheath and the jaws at the insertion of the palpi, is geniculate and folded below in such a manner that in the species where these pieces are longest, the spurious trunk extends along the breast. The maxillary palpi are generally very short, almost setaceous or conical, and of from one to six joints ; the labial are larger, and of four joints. The Apiariæ resemble the other Hymenoptera with stings in the general form of their body and sexual differences. All have four wings, with one radial areola, two or three cubital areolæ, and two recurrent nerves in the upper wings. The abdomen is armed with a concealed sting, and is composed of six segments in the females and neuters ; the males have an additional segment. It is generally of an ovoid form attached to the thorax by a very short pedicle. The posterior pair of feet are largest, and very remarkable in the females and neuters, for the numerous hairs and down with which the legs and the first joint of the tarsi are furnished. These insects fly with rapidity, and with a humming noise, from flower to flower, for the purpose of extracting by means of their proboscis, which they elongate and sink to the bottom of the corolla, the honey of the nectaries ; and collect the pollen or fine dust of the stamina upon their posterior legs. This pollen, mixed with a little honey, forms the food of the larvæ. The body of the larva is oblong, narrowed at both extremities, white, soft, divided into twelve segments without feet, with a small scaly head, and the appearance of eyes, mandibles, jaws, and a lip, and on each side nine stigmata. After having acquired their full size the larvæ spin a cocoon, where they are changed into pupæ. In all the solitary Apiariæ, however, of temperate climates, the pupæ do not undergo their last transformation till the following year.

I. *Two kinds of individuals ; no neuters or workers ; posterior feet destitute of a hairy depression on the exterior side of the legs, and of a brush on the internal face of the first joint of the tarsi.*

1. SOLITARIÆ.

1. First joint of the posterior tarsi not dilated at the exterior angle of its inferior extremity ; the following joint arising from the middle of this extremity.

A. Labial palpi with the joints slender, linear, nearly similar in form and colour to the maxillary palpi.

Posterior feet of the females with a tuft or hairy ; no tuft on the belly.

1. *Andrenoides.*

a. Mandibles and labrum united above.

Gen. ROPHITES, SYSTROPHA, ANCYLOSCELES, (insects of Brazil ;) PANURGUS.

b. Mandibles and labrum furrowed above ; third joint of the antennæ much elongated in the females.

Gen. XYLOCOPA.

B. Labial palpi in the form of a scaly bristle, the first two joints very large compared to the last two, much compressed, scaly, with the borders membranous.

a. Auricles or appendages of the labium very short, in the form of scales; mandibles of the females robust, edged, generally triangular and multidentate; labrum as long or longer than broad; belly of the females commonly furnished with a silky brush.

2. *Dasygastræ*.

* Body narrow and elongated; abdomen oblong.

Gen. CERATINA, CHELOSTOMA, HERIADES, STELIS.

** Body of medium length, not cylindrical; abdomen triangular or semioval.

Gen. ANTHIDIUM, OSMIA, LITHURGUS, (*Centris cornuta*, Fab.); MEGACHILE.

b. Appendages of the labium in many long, narrow, and in the form of setæ; mandibles of both sexes narrow, slightly or not dentated, not edged; labrum generally short, semicircular; no tuft at the belly nor the posterior feet for collecting pollen; body glabrous or hairy.

Parasitical insects; scutellum of many notched or bidentate.

3. *Cuculinæ*.

* Labrum longitudinal, either of a long square form or in the form of an elongated and truncated triangle.

Gen. CÆLIOXYS, AMMOBATES, PHILEREMUS.

** Labrum short, almost semicircular or semioval.

† Appendages of the labium much shorter than the labial palpi.

Gen. PASITES, EPEOLUS, NOMADA.

†† Appendages of the labium almost as long as the labial palpi.

Gen. OXÆA, CROCISA, MELECTA.

2. First joint of the posterior tarsi dilated at the exterior angle of its inferior extremity; the following joint inserted nearer the internal angle of this extremity than of the opposite angle.

4. *Scobulipedes*.

A. Maxillary palpi of five or six joints.

Gen. EUCERA, MELISSODES, (from Brazil, analogous to the preceding;) MACROCERA, MELITTURGA, TETRAPEDIAS, SAROPODA.

B. Maxillary palpi of at most four joints; sometimes none, or of one joint.

Gen. CENTRIS, MELITOME, EPICCHARIS, ACANTHOPUS,—genera belonging to the New Continent.

II. *Three kinds of individuals; posterior feet with a depression on the internal side of the legs, and a silky brush on the internal face of the first joint of the tarsi.*

2. *SOCIALES*.

I. Posterior legs terminated by two spines.

Gen. EUGLOSSA, BOMBUS.

II. Posterior legs without spines at their extremity.

Gen. APIS, MELIPONA, TRIGONA.

Gen. APIS, Lin.

Labium filiform, composing with the jaws a kind of proboscis, geniculate and bent downwards; first joint of the posterior tarsi large, much compressed; no spines at the extremity of the last two legs; upper wings with one radial and three cubital cells.

The insects of this genus, at least the species which furnish honey and wax, have been known from the most distant periods ; and although the name has since been applied to insects of the same order, either solitary or living in families, which collect the pollen from flowers, it is now appropriated restrictively to the species which is reared as an object of rural economy. The appearance of the domestic bee is well known. It is of an oblong form and pubescent, with a triangular head, nearly the breadth of the thorax, bearing two filiform, geniculate, and short antennæ, of from ten to twelve joints. The eyes are large, oval, and entire, and there are three ocelli disposed in a triangular form on the vertex. The mouth is composed of a transverse labrum, two strong mandibles, two jaws, a long and slender lip, and four palpi, of which the maxillary ones are very small, and the labial ones long. The lip is terminated by a long tongue, or proboscis, striated transversely, hairy, with the extremity truncated and slightly dilated. This tongue is inclosed in a scaly, semicylindrical sheath. The thorax is short, rounded, very obtuse behind ; and the abdomen, conical or truncated before, and rounded or convex above, is suspended at its posterior extremity by a small filament or peduncle. The abdomen is composed of from six to seven segments. The legs are less hairy than in the other congeneric insects, and the first joint of the tarsi is large, flattened, in the form of a square palette, a little longer than broad. All the individuals have wings. The upper wings have a narrow and elongated radial cell, and three cubital cells, of which the first is square, the second triangular, receiving the first recurrent nerve, and the third oblique, linear, receiving the second recurrent nerve.

The societies of Bees include three kinds of individuals :—the workers or neuters, forming the greater portion of the population ;—the males or drones in limited number ;—and the females, of which there is generally but one in each hive, known by the name of the *Queen-bee*. The workers and the females are armed with a sting ; and M. Huber Junior has remarked a difference among the workers, the largest being destined for out-door employment, and the smaller busying themselves in cleaning the cells and feeding the larvæ within. Of the number of bees in a hive, from 15,000 to 30,000, the males or drones form a portion to the extent of 200 to 1000 or upwards, the queen or female bee one, and the others are neuters or workers. The males and females are only evolved for the reproduction of the species. The female deposits a great number of ova each day in spring, the cells for which are prepared by the workers ; and the deposition of ova ceases in autumn, because then the pollen of flowers for the support of the larvæ fails. The individuals first produced are all workers ; about the end of two months the ova for the males are laid, and afterwards those for the females, which are all deposited in corresponding cells. The ova are of an oval elongated form, slightly bent, of a bluish white colour, about a line long, and they are hatched in the course of three, four, five, or six days, according to the temperature. The larvæ produced from these ova are in the form of a small wrinkled white worm, without feet ; and they are fed by the workers, who visit each cell for this purpose with their appropriate food. The cells not occupied by the larvæ are filled with honey. The combs are placed parallel to one another, and the cells of which they are composed are of a hexagonal form, constructed with much art and regularity.

The number of bees in a hive soon increase so much that emigration is necessary, and swarms leave the parent hive to form another establishment. In these cases the cultivator of bees has a new hive ready for the colony ; and many means are used to direct the attention of the animals to their new dwelling. For the details of their habits and management in these and other particulars, as well as much that is interesting in the history of bees, the works of Huber and others may be consulted. When deprived of a queen, another is soon produced by the workers rearing one of their own larvæ for this purpose, which, by a particular treatment, becomes a female. This fact has led to the opinion, that the neuters or workers are but imperfectly developed females. At a certain period of the year the males, having fulfilled the purpose of their being, are put to death, along with all their pupæ and larvæ.

Bees are found in a natural state in the forests of Russia and in different parts of Asia, occupying cavities in trees, &c. They have many enemies, such as among the Mammalia, mice and rats ; among the birds the swallow and other insectivorous birds ; and among the insect tribes wasps and ants. They are also subject to many diseases. The duration of the life of bees is not known with certainty. Virgil and

Pliny give seven years as the term, and others extend it to ten. But of five hundred bees which Reaumur marked with red varnish in the month of April, not one was found living in November. By a succession of generations, however, hives have been preserved for upwards of twenty-five years. The honey stored up in the hives is for the supply of the animals in winter or unfavourable weather; and this is more or less exhausted as the winter is mild and open, or the reverse. In severe cold the inhabitants of the hive remain in a state of torpor.

A. mellifica, Lin. The Honey Bee. Blackish; abdomen of the same colour, with a transverse grayish band, formed by the down at the base of the third and following segments. Inhabits Europe, &c.—*Shaw*, vi. pl. 98.

A. Ligustica, Spinol. Nearly similar to the preceding; the first two segments of the abdomen, except the posterior margin, and the base of the third, pale reddish. Italy.—*Nouv. Dict.* i. 47.

A. unicolor, Lat. Almost black, shining, the abdomen without spots or coloured bands. Inhabits Isle of France.—*Nouv. Dict.* i. 47.

A. Indica, Fab. Black, with a gray cinereous down, the first two segments of the abdomen and the base of the third reddish brown. Inhabits Bengal, &c.—*Nouv. Dict.* i. 47.

ORDER IX.—LEPIDOPTERA, Lin.—*Glossata*, Fab.

Four membranaceous wings covered with a farina composed of small scales, and a trunk rolled up in a spiral form at the mouth.

The mouth in this order is formed of a conical or subulate labrum, often scarcely perceptible, of two horny, very small, and rudimentary mandibles; two elongated horny jaws, in the form of tubular filaments, fixed below as far as the origin of the palpi; with a lip similarly fixed, and uniting by the internal margin to form a trunk (*lingua*, Fab.) which is rolled up in a spiral form in repose. The interior of this trunk contains three canals. The maxillary palpi, often indistinct, are two in number, one of three joints, inserted near the bend of the jaws; and two labial ones of three joints, furnished with hairs or scales, forming a kind of sheath for the trunk. The lip is formed of one flat and triangular piece. The four wings are covered with very small scales, easily detached, and resembling a fine powder. At the base of each of the upper wings is an appendage prolonged backwards, which is termed *tegula* or *pterygota*. The presence of this appendage forms one of the distinctive characters of the order. The wings appear membranaceous and simply veined, when the dust by which they are covered is removed. In many species a portion, more or less large, of the wings is naked and transparent. The scales are fixed by means of a pedicle, with great symmetry, like the tiles of a roof. Their forms are various, very often triangular, with the upper lobe broad and dentated. The colours are equally diversified and often extremely brilliant. The head is furnished, beside the two ordinary eyes, with two ocelli, placed on each side near the internal margin of the others. The thorax is formed of three segments intimately united, the second or *mesothorax* being the largest. The scutellum is triangular. The antennæ are composed of numerous joints. In those which fly by day, or the *diurnæ*, they are always simple, and thickest at the extremity; and in the nocturnal species the antennæ are filiform, simple, serrated, or pectinated. All the tarsi have five joints. The metamorphosis in this order is complete. The females deposit their ova, often very numerous, on vegetable substances, upon which, when hatched, the larvæ feed. The larvæ, generally known by the name of caterpillars, have six scaly or hooked feet, and from four to ten membranous ones. The pupa or chrysalis is in the form of a mummy, or covered with a coriaceous skin, through which the exterior parts of the animal are distinguished. The body of these larvæ is in general elongated, almost cylindrical,

hairy, variously coloured, sometimes rough with hairs or spines, and composed, besides the head, of twelve segments, with nine stigmata on each side. The head is covered with a horny skin. They feed on vegetables.

FAMILY I.—DIURNA.

Wings always free in repose, perpendicular to the plane of position, and destitute of a bridle or scaly bristle at the base of the inferior wings; antennæ in a great number terminated in a small club or button, more or less conical or triangular; in others slender and hooked at the end.

The insects of this family fly and feed by day. The caterpillar has sixteen feet, and lives on vegetables. The pupæ are almost always naked, or destitute of cocoon, fixed by the posterior extremity of the body, and in many by a silky band, forming a kind of half ring at the upper part of the body.

TRIBE I.—PAPILIONIDES.

Legs with one pair of spurs or spines; four wings, elevated perpendicularly in repose; antennæ terminated in a club, or almost filiform, without hooks at the end, with the exception of one genus, in which they are setaceous and plumose in one of the sexes.

I. Third joint of the labial palpi very small and scarcely perceptible, or very apparent, and furnished with scales; hooks at the end of the tarsi projecting; caterpillar elongated, subcylindrical; chrysalis angular.

II. Six feet, proper for walking, or almost similar in both sexes; chrysalis fixed by a silky band and by its posterior extremity, or inclosed in a thick cocoon; central areola of the lower wings closed posteriorly.

1. *Hexapoda*.

A. Internal margin of the lower wings concave.

Gen. *PAPILIO*, *PARNASSIUS*, *THAIS*.

B. Internal margin of the lower wings arched and projecting over the abdomen to form a gutter.

Gen. *COLIAS*, *PIERIS*.

I. The two anterior feet shorter than the others, folded, not ambulatory, in both sexes, or only in the males; chrysalis fixed by its posterior extremity, and suspended with the head downwards; central areola of the lower wings open posteriorly in a great number.

A. Central areola of the lower wings always closed posteriorly; the two anterior feet, although small and folded, almost similar to the others; lower wings in general scarcely embracing the abdomen below; labial palpi slightly elevated above the hood, much separated, slender, cylindrical.

Gen. *DANAUS*, *IDEA*, *HELICONIUS*, *ACREA*.

B. Central areola of the lower wings open in a great number; two anterior feet often very small and concealed, or apparent and very hairy; lower wings embracing the abdomen below; labial palpi rising above the hood, and not distant, slender and cylindrical.

a. Central areola of the lower wings open posteriorly.

* Labial palpi either separated in their whole length, or simply at their extremity, and abruptly terminated by a slender and a circular joint.

2. *Perlata*.

Gen. *CETHOSIA*, *ARGYNNIS*.

** Inferior palpi contiguous in all their extent, and not terminated abruptly by a slender and acicular joint.

† Antennæ terminated in a small club, in the form of a button, short, turbinated, or ovoid; caterpillar very spinose.

Gen. VANESSA.

†† Antennæ terminated in an elongated club, or almost filiform; caterpillar naked or slightly spinous, with the posterior extremity terminated in a bifid point.

Gen. LIBYTHEA, BIBLIS, NYMPHALIS, MORPHO.

b. Central areola of the lower wings closed posteriorly.

Gen. PAVONIA, BRASSOLUS, EURIBIUS, SATYRUS.

II. Third or last joint of the labial palpi very distinct, naked, or less furnished with scales or hairs than the preceding; hooks of the tarsi scarcely sensible; caterpillar oval; chrysalis without eminences or angular projections.

3. *Argus*.

1. Antennæ terminated by an inflation, beardless.

Gen. MYRINE, POLYOMMATUS, ERYCINA.

The Myrines are remarkable for the length and projection of the labial palpi. The Polyommati with the antennæ terminating in a cylindrico-oval and elongated club form the genus *Thecla* of Fabricius.

2. Antennæ either setaceous or plumose, or moniliform at the end.

Gen. BARBICORNIS, ZEPHYRIUS.

Gen. PAPILIO, Lat. Lin.

Chrysalis naked, angular, fixed by the tail and by a silky band disposed transversely and terminating on each side on the plane of position; perfect insect with six feet proper for walking in both sexes.

The animals of this and the connected genera have an elongated body, always pubescent or covered with scales; the head rounded, compressed before, broader than long, narrower than the thorax, with two antennæ, generally shorter than the body, composed of a great number of indistinct joints, with a cylindrical stalk and terminated by a club; two exterior or inferior palpi, cylindrical or conical, covered with scales or very hairy, of three joints, of which the last is very small or almost none, in many. Tongue filiform, rolled up in a spiral form between the palpi in repose, composed of two pieces forming a tube for the passage of the sweet fluids. Eyes oval, reticulated, and large; thorax oval, of three intimately connected segments; abdomen oval, elongate or cylindrical, often compressed laterally, always soft; four large farinaceous wings, or covered with minute scales. These wings are triangular in some species, oblong or oval in others; and the insect in repose elevates them perpendicularly. Their posterior border presents many inequalities of form, as dentations and lobes of various figures. The upper wings rest on part of the lower ones. The abdomen of the male is deeply divided at its extremity into two lobes or valves, almost oval, and in the form of forceps. The organs of generation are internal. The feet in this group are always six in number. The legs have generally two spurs or spines at their extremity; but in some there are other two placed towards the middle of the internal side. The tarsi are five jointed, the last terminated by two hooks of various forms. In a great number the anterior feet are not calculated for walking.

The striking beauty of this group of insects has attracted attention beyond most of the other tribes. The splendid decorations indeed of their varied dress attracts even infant notice. All that is splendid in colouring is displayed in the Mosaic coating of their wings; and many naturalists, with a feeling of their superiority to all the other insect races, have placed the genus *Papilio* at the head of the class. Nature, according to some, has produced among insects animals analogous in point of colouring to the humming-birds; to which they are also analogous in the instrument by which they suck the honey from the calices of flowers. In most of the other insects the wings are exactly of amplitude sufficient for the execution of their movements; but in the tribe of butterflies the wings have been extended in multiplied forms to display the most brilliant colours. The scales, in number beyond calcu-

lation, implanted on both surfaces of the wings, and disposed like the tiles of a roof, form a species of natural Mosaic work, in finer colours, and more harmoniously combined, than the imitations of human art.

The female butterfly deposits her ova upon vegetables proper for nourishing the caterpillars when hatched. These caterpillars after a certain period, and after some changes of skin, take a new form, or become chrysalids,—a state in which the future butterfly is enveloped under a naked skin, rough with projecting points, and often strewed with points of a gold or silver colour, which distinguishes the chrysalids of this genus from all the other Lepidoptera. Sometimes these chrysalids are suspended vertically and fixed by the posterior extremity of their body by means of a small tuft of silk, or by a band of the same nature. From this chrysalis after a time the butterfly comes forth; and Swammerdam demonstrated in the presence of the Grand Duke of Tuscany, the development of members so marvellously inclosed in this outer covering. The greater number of the Lepidoptera remain eight or nine months in the chrysalis form; but in the present genus, all the metamorphoses take place in about two months; and when the weather is genial, the change from the chrysalis to the perfect insect takes place in fifteen days. The caterpillars which are transformed into chrysalids in the end of autumn pass the winter in this state, and the perfect insect appears in the following spring.

* *Lower wings prolonged into a tail.*

P. Machaon, Lin. Wings yellow or yellowish green in some varieties, with the nerves black, the posterior border with two rows of parallel lunated spots; upper wings with three short black bands at the side; lower wings terminated in a narrow tail, with a row of blue spots over the black border which terminates them; the internal ones ocellated. Inhabits Europe.—*Shaw*, vi. pl. 64.

** *Lower wings not prolonged.*

P. Priamus, Lin. Upper wings silky green above, with a large black spot occupying the greater part; upper part of the lower wings silky green, with four round black spots and three orange ones in each; posterior margin black; under surface of the upper wings brownish black. Inhabits Amboyna.—*Nouv. Dict.* xxiv. 513.

TRIBE II.—*HESPERIDES.*

Posterior legs with two pairs of spurs; lower wings almost horizontal in repose; antennæ terminated in some by a club or button, hooked at the end; in others filiform, with the extremity slender, bent, and pointed.

Gen. *HESPERIA*, *URANIA*.

Gen. *HESPERIA*, Lat.

Antennæ terminated in a club; inferior palpi short, of three joints, broad, and furnished with scales anteriorly; body short and thick; wings triangular, thick, generally horizontal in repose; abdomen short, almost conical; feet strong, and the posterior legs with two spines more than the others; tarsi terminated by two small, simple, and arched hooks.

The metamorphosis of the Hesperides differs from that of the Papilionides. The caterpillars resemble those of many nocturnal Lepidoptera. They are almost naked, slenderest at the two extremities, or fusiform, with a globular head. They are found between leaves, which they fix together with their silk. The pupæ also resemble those of the nocturnal Lepidoptera. They have no eminences or angular projections, and are inclosed in a slight web, and often on leaves.

* *Inferior wings prolonged into a tail.*

H. proteus, Lat. Wings brown, with five or six square semitransparent spots and black transverse bands below the inferior ones. Inhabits south America.—*Nouv. Dict.* xiv. 446.

** *Inferior wings not prolonged.*

H. malvæ, Lat. Wings dentated, blackish, with deeper spots, of which many are disposed in bands, some almost black, with white transparent points, and many square; under side of the wings paler and less spotted, and the whitish points disposed in two or three transverse lines. Inhabits Europe, on the mallow.—*Shaw*, vi. pl. 71.

FAMILY II.—CREPUSCULARIA.

Exterior border of the lower wings with generally near its origin a strong and pointed stiff horny bristle, which enters into a groove below the upper ones, and retains the four in a horizontal situation in repose; antennæ in the form of an elongated club, those of many males, and sometimes both sexes, pectinated or serrated; caterpillars with always sixteen feet.

TRIBE I.—HESPERI-SPHINGES, Lat.

Antennæ always simple, terminating in a club, with the extremity hooked and without a tuft of scales.

Gen. CORONIS, CASTNIA, AGARISTUS.

Gen. CASTNIA, Lat. Fab.—*Papilio*, Lin.

Antennæ with a terminal elongated club; palpi subcylindrical, adpressed, not contiguous, shortly scaled, and distinctly three jointed.

C. Cyparissias, Lat. Wings black, entire, with two white bands, oblique before, and dotted behind. Inhabits South America.—*Fab. Spec.* ii. 52.

TRIBE II.—SPHINGIDES, Lat.

Antennæ always terminated by a small scaly tuft in a prismatic club, commencing near the middle of their length; lower palpi broad, very scaly, with the third joint smaller, and generally indistinct.

Gen. SMERINTHUS, ACHERONTHIA, SPHINX, MACROGLOSSUM.

Gen. SPHINX, Lat. Lin.

Lower palpi with but two apparent joints, the third being very small, contiguous, scaly; club of the antennæ commencing near the middle, simple, or with three transverse striæ, bearded, never strongly serrated; a corneous and very distinct tongue; body short, thick; eyes large; wings almost horizontal, forming a triangle with the body; abdomen conical; feet thick, with two simple hooks at the end of the tarsi.

The insects of this genus are ornamented with lively and agreeable colours. They fly lightly and in numbers, about sunset, from flower to flower, sucking melliferous liquids with their long trunk. The caterpillars have sixteen feet, and their skin is smooth or granulated, and without hairs. Almost all have a kind of bent horn on the eleventh ring, of which the use is not known. Among the caterpillars that which is found on the lilac and ligustrum is remarkable for the singularity of its attitude. It is generally fixed to a branch by its membranous feet, with the body elevated perpendicularly and the head inclined, and remains for hours in this position. Its appearance in this attitude being conceived to have some resemblance to the figures of the fabulous sphinx, the genus has from this circumstance received the name.

S. atropos, Lin. Upper wings of a deep brown, with irregular spots of brownish and bright yellow, the lower wings yellow, with two transverse brown bands; abdomen grayish-blue, with the sides yellow, and a transverse black band on each segment; thorax black, with a large irregular yellow spot, and black points, representing a death-head. 5 inches broad between the wings. Inhabits Europe.—*Shaw*, vi. pl. 74.

This species emits a sound resembling a plaintive cry, which Reaumur says is produced by the rubbing of the palpi against the trunk. They sometimes appear in great numbers; and one year, being particularly numerous in some parts of Brittany in France, when an epidemical disease was raging, they were looked upon with terror as the harbingers of death. The caterpillar is of a deep yellow colour, with spots of deeper and lighter green. It feeds on the leaves of the potatoe, changes into a pupa towards the middle of summer, and becomes a perfect insect in autumn.

S. convolvuli, Lin. Brown, with paler and darker bands on the upper wings; abdomen with transverse black and red bands. 2 inches long. The caterpillar is brown or green, with lateral and oblique bands and black dots. Europe.—*Shaw*, vi. pl. 73.

S. ligustri, Lin. Upper wings veined with blackish brown, and of a reddish-white or gray colour; the lower rose-coloured, with two black bands; thorax brown, with a reddish band on each side; abdomen vinous red, with a black band on each wing, separated in the middle by a longitudinal reddish band. Inhabits Europe, in gardens, flying about in the evening. Caterpillar apple-green, with seven oblique lilac and white bands.—*Fab. Spec.* ii. 150.

TRIBE III.—ZYGÆNIDES, Lat.

Antennæ of the greater number destitute of tufted scales at the extremity, fusiform, or like a ram's horn; labial palpi slender, compressed, cylindrical or conical, with the third joint very distinct.

The caterpillars in this tribe have all sixteen feet, and are destitute of a horn at the posterior extremity of the body. Some live in the interior of vegetables; others are naked and hairy.

I. Antennæ simple in both sexes.

Gen. *SESIA*, *ÆGOCERA*, *THYRIS*, *ZYGÆNA*, *SYNTOMIS*.

II. Antennæ bipectinated in the males, simple in the females.

Gen. *PROCRIS*, *ATYCHIA*.

III. Antennæ bipectinated in both sexes.

Gen. *GLAUCOPIS*, *AGLAOPE*, *STYGIA*.

Gen. *ZYGÆNA*, *Fab.* Lat.—*Sphinx*, Lin.

Antennæ simple in both sexes, terminating abruptly in a conve-

luted club, at least in one of the sexes, and without a tuft at the extremity ; lower palpi cylindrico-conical, rising above the hood ; abdomen almost cylindrical and obtuse ; wings sloped ; spines at the extremity of the legs very small.

The insects of this genus fly little, are rather inactive, and are found on the plants where the female deposits her ova. Both sexes live in the perfect state but for the time that is necessary for reproduction. The caterpillars have sixteen feet. They are smooth, slightly hairy, and have not, like those of the *Sphinxes*, a horny appendage on the last segment. To change into pupæ they inclose themselves in a solid cocoon, which they form along a branch or leaf, and the perfect insect is produced in a short time after.

Z. filipendula, Lat. Fab. Antennæ and body of a blackish or bluish-green ; upper wings deep changeable green, downy, with six red spots on each ; the lower wings red, without spots ; legs long and black. Inhabits Europe, in meadows.—*Fab. Spec. ii. 157.*

Z. scabiosa, Lat. Antennæ and body of a black colour ; upper wings green, with one or three united red spots. Inhabits Europe.—*Fab. Spec. ii. 158.*

FAMILY III.—NOCTURNA.

All the wings horizontal or inclined in repose ; antennæ setaceous.

With the exception of a small number, the lower wings in this family are furnished with a bridle, formed by a strong and sharp horny bristle, or a bundle of setæ adapted to a groove in the upper wings, and keeping them horizontal when at rest. The chrysalis is almost always inclosed in a cocoon rounded before, or without angles. The number of membranaceous feet in the caterpillar varies.

TRIBE I.—BOMBYCITES, Lat.

Antennæ pectinated or serrated, at least in the males ; spiriform trunk very short, or almost none ; body generally woolly and thick in the females ; wings often extended, and when they are inclined, the lower ones margin the other two, or are turned up ; caterpillars with sixteen feet.

I. Wings broad, either extended or inclined like a roof, the lower ones bordering in this case the upper ; caterpillars living discovered, on leaves.

Gen. *ATTACUS*, *LASIOCAMPUS*, *BOMBYX*.

II. Wings oblong, narrow, always inclined, the lower ones entirely covered ; caterpillars living in the interior of vegetables, or concealed in the earth and gnawing their roots.

Gen. *HEPIALUS*.

Gen. *BOMBYX*, Fab. Lat.—*Phalæna*, Lin.

Wings entire, extended horizontally or inclined, forming a triangle with the body ; superior palpi concealed, the lower ones very small, in the form of tubercles, cylindrical or conical, and diminishing in thickness towards their point ; tongue none or indistinct ; antennæ pectinated, at least in the males ; abdomen very large in the females ; caterpillar with 14 or 16 feet ; a forked tail in place of the last two in those which have fourteen.

This genus was included by Linnaeus in his genus *Phalana*, and formed one of its divisions. The body of the *Bombices* is, however, always thicker than the *Phalana*, and they live in the perfect state for a much shorter time than the other nocturnal lepidopterous insects. Incapable of taking nourishment in this state, from wanting a tongue and trunk, the winged insect exists only for the purpose of reproduction.

B. Atlas, Lat. Fab. Body reddish-brown; antennæ fawn-coloured and pectinated; upper wings the colour of the body, falcated at their extremity, the base grayish ferruginous; middle of the disc with a transparent triangular spot, bordered with blackish, and sometimes a smaller one near the exterior border; disc ferruginous, divided by a whitish band; extended wings 8 inches broad. Inhabits China, &c.—*Fab. Spec. ii. 167.*

B. pavonia major, Fab. Antennæ pectinated; thorax deep brown, with a large white band on the anterior part; wings brown, with waved transverse reddish-brown and gray lines, the extremity bordered with a broad whitish-brown band, and an ocellated spot surrounded with gray, red, and black on the middle of the four wings; extended wings 5 to 7 inches broad. Inhabits Southern Europe.—*Shaw, vi. pl. 76.*

B. pavonia minor, Fab. Wings rounded, clouded with gray, and waved with fuscous lines and an ocellated spot on each wing; extended wings 2 inches long. Britain. Found near Edinburgh.—*Fab. Spec. ii. 171.*

This and the preceding species which resemble each other much, except in point of size, are by some considered as varieties of one species, and by others as two distinct species. The Caterpillars of both are tuberculated, feed on the leaves of fruit trees, and towards the end of summer forms a brown solid cocoon of an oval form, terminating in a soft point at one of its ends, the silk being very strong and gummy.

B. tau, Fab. Wings reddish yellow, with an ocellated violet spot, of which the centre or pupil presents whitish streaks of the appearance of the letter T. Inhabits Europe, on the birch.—*Fab. Spec. ii. 172.*

B. processionea, Fab. Antennæ pectinated, reddish-brown; body and wings gray cinereous; wings above with some transverse waved brown lines; under parts gray; caterpillar hairy, of a gray colour, and with sixteen feet, with some yellow tubercles. Inhabits Europe, on the oak.—*Fab. Spec. ii. 180.*

The caterpillars of this species live in society on the oak, and spin webs in common, where they remain till they change their skin. Towards the commencement of summer they make a nest of from eighteen to twenty inches long, and five or six broad, the centre of which rises four inches above the branch upon which it is fixed. The walls are formed of many webs attached together, and the space in the centre is occupied by the caterpillars. One small opening serves for their entrance and exit. During the heat of the day they remain concealed, and come out at night to feed. They have their specific name from the formal manner in which they arrange their march. The first which comes forth makes a signal, and another comes out, till the whole are arranged in regular files, sometimes to the number of eight. When about to change into pupæ, each spins its own cocoon, and they remain under this form about a month. The nest of these caterpillars often produces inflammation when touched with the hand.

B. mori, Fab. Lat. The Silk-worm Moth. Antennæ brown, pectinated; wings white, with transverse brown lines, the upper ones

slightly falcate, the under ones in repose margining the upper ones ; antennæ of the females less pectinated than those of the males ; caterpillar smooth, with sixteen feet, and of a whitish yellow colour, the skin wrinkled behind the head, and a small horn on the last segment.—*Shaw*, vi. pl. 77.

This species, of which the caterpillar is known by the name of the silk-worm, is said to have come originally from the northern provinces of China ; and before the introduction of the animal into Europe, the silk which is procured from its cocoon was sold for more than its weight in gold. The city of Turfau in Bucharia, the metropolis of the Seres, or the Serica of Ptolemy, was for a long period the principal rendezvous and the depot of the silk merchants of China. Expelled from their country by the Huns this people established themselves in Great Bucharia and India ; and it is related that the Greek missionaries in the reign of the Emperor Justinian transported the ova of the silk worm in reeds for the first time to Constantinople. The cultivation of this useful animal was thus extended to Southern Europe, and was afterwards introduced into Spain and Africa by the Arabs. In the time of the Crusaders the insect passed from Morea into Sicily and Calabria. From Calabria the mulberry and the ova of the same animal were brought to France by some of the followers of Charles VIII. on his conquest of Naples ; and the cultivation of this insect was afterwards encouraged and patronized by Sully as an important branch of national industry. The mode of feeding and managing the caterpillar or silk worm, and procuring its delicate web, is detailed in numerous works, both scientific and economical. The caterpillar feeds, as is well known, upon the leaves of the black or white mulberry, the last being preferred. After remaining in this state for about six weeks, during which the caterpillar changes its skin four times, the animal ceases to feed, and begins to form an envelope or cocoon of silken fibres in some convenient spot, producing the minute threads till it has formed an oval yellow case or ball about the size of a pigeon's egg, in which it changes to a chrysalis. In this state it remains for about fifteen days, when the perfect insect is produced. This, however, is not allowed to happen where the animals are reared for the sake of the silk, from its being observed that the animal, before leaving its cocoon, discharges a coloured fluid, which injures the quality. The cocoons are therefore exposed to such a degree of heat as to kill the inclosed animals, a few only being saved to keep up the breed. The moth when produced is but very short-lived, breeding soon after their exclusion, and perishing when the purpose of nature is fulfilled by the deposition of ova for future races. The length of the silken thread when unrolled is said to be from 300 to 500 yards in length, and this thread is composed of two united threads or filaments agglutinated together. The manufacture of silk goods from this humble though beautiful material has been known from the earliest times. The general use of silk in Europe, however, boasts of no great antiquity. Henry II. of France is said to have been the first individual in that country who had stockings of this manufacture ; Queen Elizabeth first added black silk stockings to the royal wardrobe ; and her successor James I. of England, before his accession to the English crown, wrote to the Earl of Mar for the loan of a pair of stockings of the same material, to appear with dignity before the English Ambassador. Towards the end of this prince's reign, however, the broad silk manufacture was prosecuted in England to a considerable extent ; and in 1661, the Silk-Throwsters of London employed above four thousand persons. The manufacture of silk goods is now an important branch of British industry.

TRIBE II.—NOCTUO-BOMBYCITES.

- I. Caterpillars always smooth, with sixteen feet, living in the interior of different vegetables, generally ligneous ones. Margins of the segments of the abdomen of the chrysalis dentated or spinous ; spiral trunk in the perfect insect always very short, or almost none ; antennæ of some males furnished interiorly with a double row of beards ; those of the females and both sexes in others with a series of short rounded teeth in all their length.

Gen. COSSUS, ZEUZERA.

- II. Caterpillars living always in open day, naked, smooth, with fourteen feet, the anal ones wanting ; posterior extremity of the body pointed, forked, or entire and trun-

cated ; antennæ of the males always pectinated, and terminated by a simple filament.

1. Spiral trunk very short and indistinct.

Gen. CERURA.

2. Spiral trunk distinct, perceptibly prolonged when unrolled beyond the palpi.

Gen. DICRANOURA, (*N. ulmi*, Huber;) PLATYPTERYX.

III. Caterpillars living always in open day, and with sixteen feet, the anal ones never wanting.

1. Spiral trunk almost none, or very short, concealed between the palpi, and useless in manducation.

A. Caterpillars never forming a portable tube of vegetable matters.

a. Caterpillars elongated ; upper part of the skin of the segments not forming a vaulted arch over the body.

* All the individuals with wings proper for flight.

Gen. NOTODONTES, SERICARIA.

** Females apterous, or without wings.

Gen. ORGYA.

b. Caterpillars oval ; upper part of the skin beginning at the second ring, forming a solid arch under which the head and the first segment may be retracted ; feet scaly, retractile, the membranous ones exuding a viscid fluid.

Gen. LIMACODES.

B. Caterpillars inclosed in portable tubes, which they form with fragments of vegetables, and bind together with their silk.

2. Spiral trunk very apparent, projecting beyond the palpi, and proper for suction.

Gen. CHELONIA, (*Arctia*, Schr. ;) CALLIMORPHA.

Gen. COSSUS, Lat. Fab.—*Phalæna*. Lin.

No tongue ; exterior palpi cylindrical, pretty thick, covered with scales ; antennæ setaceous, as long as the head and trunk, with a series of short transverse and obtuse dentations along the interior side ; wings inclined.

The caterpillars of this genus are very prejudicial to trees, gnawing the roots and even their substance. Preparatory to undergoing their change into the chrysalis state, they construct a cocoon with earth or the fragments of the substances which they gnaw.

C. *ligniperda*, Fab. Antennæ slightly pectinated ; body and wings of a deep gray, and the wings with a number of small brown spots and black lines. Europe, on the willow, poplar, elm, and oak. $2\frac{1}{2}$ to 3 inches, the extended wings. B.—*Fab. Spec.* ii. 182.

The caterpillar of this species is smooth, of a reddish colour, with the head black. It begins by perforating the bark of the trees, and afterwards makes its way into the interior. Lyonnet has detailed the structure of this caterpillar in his "*Traité Anatomique de la Chenille du Saule*," 1 vol. 4to.

TRIBE III.—TINEITES, Lat.

Caterpillars with sixteen feet or more, living for the most part in fixed or portable tubes, formed of the substances they gnaw agglutinated together ; but some are without this covering : upper wings narrow and long, the lower broad and plicated, sometimes resting horizontally on the body, or hanging almost vertically on the sides and raised upwards behind ; body

cylindrical, or narrow and elongated; labial palpi in some short, almost cylindrical, in others thrown backwards in the form of horns; antennæ generally simple.

The insects of this tribe are very small, but often ornamented with brilliant colours. The margin of their wings is fringed. The caterpillars have generally sixteen feet, and they live under cover, some in tubes, which they fabricate, and others, which have in consequence received the name of miners, in galleries formed in the interior of leaves. The species which destroy woollen cloths, furs, &c. are in portable tubes. The miners furrow the parenchyma of leaves, and are sometimes very destructive to fruits and seeds.

I. Antennæ and eyes separated.

1. A distinct and elongated spiral trunk.

A. Wings resting horizontally on the body, or forming a rounded slope; labial palpi not longer than the head.

Gen. LITHOSIA, YPONOMEUTA.

B. Wings pendant; labial palpi much longer than the head and thrown backwards above the thorax

Gen. ECOPHORA.

2. Tongue very short or almost none; a tuft of scales or hairs on the head.

A. Labial palpi large, projecting.

Gen. EUPLOCAMPUS, PHYCIS.

B. Labial palpi small, not projecting.

Gen. TINEA.

II. Antennæ (very long) and eyes almost contiguous.

Gen. ADELA.

Gen. TINEA, Lat.—*Phalæna*, Lin.

Antennæ setaceous, simple or ciliated, distant; wings linear, rolled around the body; trunk very short or none; two short hairy cylindrical palpi; a tuft of scales on the front.

The insects of this genus are very destructive, particularly to woollen cloths and furs. Inclosed in their tube, composed of the materials in which they are found, the caterpillars perforate, eat, and digest these substances. At the commencement of spring they change into pupæ, and remain in this form about twenty days. After coupling, the female deposits her ova in the substances upon which the young are afterwards to feed, and the caterpillars are hatched in fifteen days after. Many means have been proposed to prevent the ravages of these small insects; but the most effectual is oil of turpentine. A piece of cloth or paper saturated with this oil, and placed in the trunks, presses, or wardrobes, to be protected from their depredations, soon kills them. Spirit of wine or tobacco smoke are equally effectual; but the one soon evaporates, and the application of the other is difficult.

T. *sarcitella*, Fab. Yellowish silvery gray, with the posterior margin of the wings fringed. Inhabits Europe, in houses.—*Nouv. Dict.* xxxiii. 9.

T. *pellionella*, Fab. Of a bright lead gray, and the upper wings with each two or three black points in their middle. Inhabits Europe. B.—*Fab. Spec.* ii. 295.

T. *flavi-frontella*, Fab. Upper wings cinereous and the tuft of the head reddish. Inhabits Europe, committing great devastation in museums.—*Nouv. Dict.* xxxii. 11.

T. *granella*, Lat. Antennæ short; body cinereous, more or less ob-

scure ; head covered with fine long hairs of a whitish yellow colour ; upper wings grayish, cinereous, or obscure, with many irregular brown spots and points ; lower wings blackish, without spots. Inhabits houses in Europe, and the caterpillar in grains of wheat, rye, and barley.—*Nouv. Dict.* xxxiii. 11.

TRIBE IV.—NOCTUÆLITES.

Nocturnal, with the wings entire, extended horizontally or sloping and forming a triangle with the body ; tarsi and labial palpi bent, compressed, furnished with scales, and terminated abruptly by a joint shorter and more slender than the preceding.

The caterpillars of this tribe are always naked and never want the anal feet. The general number of their feet is sixteen, but some have only twelve. The perfect insect has always a spiral trunk, and triangular wings proper for flight, in some separated, in others lying upon one another or sloping. In a great number the hairs or scales above the thorax, and often on the abdomen, form a kind of crests or denotations. The males of many species have pectinated antennæ.

I. Caterpillars with sixteen feet.

1. Labial palpi of medium size.

Gen. EREBUS, NOCTUA.

2. Labial palpi large.

Gen. CALYPTRA, GONOPTERUS, (*N. libatrix*, Fab.)

II. Caterpillars with twelve feet.

1. Labial palpi large.

Gen. CHRYSOPTERUS, (*N. concha*.)

2. Labial palpi of medium size.

Gen. PLUSIA.

Gen. NOCTUA, Fab. Lat.—*Phalana*, Lin.

Antennæ setaceous, generally simple ; tongue long, horny, rolled up in a spiral form ; upper palpi very small, concealed, the two under ones bent, with the second joint very large, compressed, and furnished with scales, and the last very small ; body covered with small scales, the abdomen conical ; thorax often tufted ; wings sloping in the greater number.

The insects of this genus, like all the other Lepidoptera, have their wings covered with a scaly dust, which the slightest touch removes ; the lower wings are plicated longitudinally on their internal side. They are commonly found in woods, gardens, and meadows, about the plants where the females deposit their ova. They fly about chiefly towards the setting of the sun, remaining during the day concealed under leaves, on branches, or fixed upon walls. They couple almost as soon as they change from the pupæ state. The male dies after coupling, and the female when she has insured the continuance of the species by the deposition of the ova. The species of this numerous genus are found on bushes and trees of various kinds.

N. aceris, Lat. Fab. Upper wings whitish gray, with black waved lines, and two rounded spots surrounded by a blackish line. Europe, on the Maple and Horse-chestnut.—*Nouv. Dict.* xxiii. 19.

N. auricoma, Fab. Lat. Upper wings obscurely cinereous, with black lines and marks ; extremity of the feet ringed with white. Europe, on the broom, bramble, &c.—*Nouv. Dict.* xxiii. 19.

TRIBE V.—TORTRICES, Lat.

Caterpillars some with fourteen, but the greater portion with sixteen feet, the anal ones never wanting; labial palpi sometimes short and cylindrical, sometimes recurved above the head, pointed, or in the form of horns.

The caterpillars in this tribe roll themselves up in leaves or flowers, or live in the interior of fruits. The wings of the insect in repose are slightly sloped or horizontal, and form with the body a broad and short triangle.

Gen. PYRALIS, VOLUCRA, (*Pyralis heracleana*); XYLOPODA, (*P. dentana*); PROCERAS (*P. Soldana*); HERMINIA, (caterpillar with fourteen feet.)

Gen. PYRALIS, Lat. Oliv.—*Phalæna*, Lin.

Antennæ setaceous; wings short, broad at their base, forming with the body a truncated ellipse or triangle, of which the opposite sides are arched near their junction.

P. prasinaria, Fab. Lat. Wings and body of a fine green; two oblique white lines on the upper wings; under side of all the wings whitish green. Inhabits Europe, on the oak and other trees.—*Nouv. Dict.* xxviii. 287.

P. fagana, Lat. Fab. Green, with oblique lines of pale red on the upper wings; antennæ and feet pale red, sometimes yellowish. Inhabits Europe, on the oak, &c.—*Nouv. Dict.* xxviii. 287.

TRIBE VI.—PHALÉNITES, Lat.

Caterpillars with ten or twelve feet, the anal ones never wanting; body naked, glabrous, generally long or linear, the two extremities approximated in walking, and the intermediate portion curved upwards in the form of a ring; chrysalis slightly enveloped, or the cocoon with but little silky matter; body of the insect often slender, with wings extended or in a flattened slope; spiral trunk none or minute; antennæ pectinated in many of the males.

I. Caterpillars with twelve feet.

Gen. METROCAMPUS.

II. Caterpillars with ten feet.

1. Males and females with wings proper for flight.

Gen. PHALÆNA.

2. Females apterous or semi-apterous, and unable to fly.

Gen. HYBERNIA.

Gen. PHALÆNA, Lat.—*Phalæna* (*Geometra*), Lin.

Antennæ setaceous, short, simple, pectinated or plumose in both sexes, or only in the males; tongue often small; lower palpi almost concealing the upper, nearly cylindrical or conical, short, and covered with small scales; wings large, extended horizontally, or slightly sloped, and the posterior border in many species angular or dentated.

This genus comprehends nearly that division of the Linnæan genus *Phalæna* termed *Geometra*. Almost all the caterpillars are smooth, with a slender elongated body,

and on the backs of many are eminences or warts resembling the knots or buds of a small branch. They live solitarily and feed on vegetables. Some eat only the leaves of certain trees, while others feed indifferently on many. They walk by approximating the feet of both extremities and raising the intermediate portion of their body into a ring or arch. Their progression is accomplished by measured projections of their anterior feet, the posterior ones being brought close up to the others at every step, the body rising at same time into an arch. This mode of walking has given rise to the application of the term *Geometra* or measurers of land, by which the genus has been characterized. These caterpillars are further remarkable for the manner in which many of them attach themselves to the branches of trees, and which proves them to be possessed of muscular strength in a great degree. Some fix their posterior feet on a small branch with the body placed vertically, and remain immovable in this position for hours, and others appear in attitudes which require the exertion of still greater muscular power. When the leaf is touched upon which one of these caterpillars is placed, it drops off, but falls not to the ground, having always a silken thread of extreme tenuity, and which it has the power of lengthening at will, by which it swings itself to the ground, and ascends at pleasure. The species destitute of posterior feet suspend themselves by the extremity of the body like the caterpillars of some butterflies. The *Phalanæ* remain for a longer or shorter time in the chrysalis form. A great number become perfect insects towards the end of summer. These all perish after having fulfilled their destination in the reproduction of ova for succeeding races; but those which do not undergo their metamorphosis till autumn remain during winter in the pupa state, and the perfect insect appears in the following spring.

P. betularia, Lat. Fab. Body thick; antennæ pectinated and terminated in a simple filament; wings white, with numerous black points; thorax with a black band. Caterpillar blackish, tuberculated, with the head cleft, and ten feet. Inhabits Europe, on the birch, willow, &c.—*Fab. Spec. ii.* 252.

P. sambucaria, Lin. Sulphur yellow, with the antennæ pectinated; two transverse obscure lines and the commencement of a third between those on the upper wings; the lower ones with a prolongation in form of a tail, and two small reddish brown spots on the posterior margin. The caterpillar is long and slender, with many elongated tubercles on its body, and when in repose resembles a small piece of dried wood. It feeds on the rose and alder. Inhabits Europe.—*Fab. Spec. ii.* 243.

P. grossulariata, Lin. Antennæ filiform, black; body yellow, with black spots; wings white, with irregular black spots, the upper ones with two transverse yellow lines. Caterpillar white, with reddish yellow and black spots. Inhabits Europe, on currant bushes. Very common in Sweden.—*Shaw, vi.* pl. 79.

TRIBE VII.—CRAMBITES, Lat.

I. Wings in a flattened slope, and forming a triangle with the body.

Gen. *BOTYS*, *HYDROCAMPUS*, (*Phalæna potamogeta*); *AGLOSSA*, *ILITHYA*, (*Crambus colonum*).

II. Wings hanging almost vertically on each side of the body, and ascending posteriorly, or rolled around it; the upper ones long, narrow, and the lower broad.

Gen. *GALLERIA*, *CRAMBUS*, *ALUCITA*.

Gen. CRAMBUS, Lat.

Four palpi, the lower ones large and projecting; wings rolled around the body in a cylindrical form; antennæ setaceous.

C. pineti, Lat. Wings reddish yellow, with two very white spots, the upper oblong, and the lower ovate.—*Nouv. Dict. viii.* 364.

C. pratensis, Lat. Wings cinereous, with a white line branched posteriorly, and their extremity with oblique rays.—*Nouv. Dict.* viii. 364.

C. carneus, Lat. Upper wings yellowish, with the exterior limb rose-coloured.—*Nouv. Dict.* viii. 364. These three species are found in Europe, in meadows and dry pastures.

TRIBE VIII.—PTEROPHORITES, Lat.

Wings, or at least two of them, cleft or digitate; body slender and elongated; feet long; antennæ simple; spiral trunk distinct; wings sometimes distant from the body, at others inclined and close. Caterpillars with sixteen feet; chrysalis naked in the greater number, coloured, and suspended by a thread; in the others inclosed in a transparent cocoon.

Gen. PTEROPHORUS, ORNEODES.

Gen. PTEROPHORUS, Lat. Fab.—*Phalæna*, Lin.

Antennæ setaceous, simple; wings divided; palpi scarcely longer than the head, and covered with scales; body narrow and elongated; wings distant from the body, in the form of arms, and the legs spinous.

P. ochrodactylus, Lat. Wings extended, entire, the upper ones gray, the lower black; body small; abdomen red at the base. Inhabits Europe, in gardens.—*Nouv. Dict.* xxviii. 236.

P. pentadactylus, Lat. Entirely white, without spots, the upper wings in two divisions, the lower in three. Inhabits Germany.—*Nouv. Dict.* xxviii. 236.

ORDER X.—STREPSIPTERA, Kirby.—*Rhipiptera*, Lat.

Two naked membranous wings, accompanied by two balancers, longitudinally folded, forming nearly the quadrant of a circle; metamorphosis incomplete; anus styliiferous.

This order was established by Mr Kirby, and afterwards adopted by Latreille, who changed the name, without any very good reason, to Rhipiptera. On each side of the anterior extremity of the trunk, near the neck and exterior base of the first pair of feet, are inserted two small crustaceous moveable bodies, in the form of small elytra. They are narrow, tortuous, elongated, dilated and clavate, and terminate at the origin of the wings. These bodies Latreille considers as a kind of poisers or balancers, while others consider them as a species of elytra or wing-cases. The mouth is composed of a labrum, two mandibles, and two jaws, bearing minute palpi of one joint, and a lip without palpi. The eyes are large, hemispherical, granulated, and slightly pedunculated. The antennæ are approximated at the base, upon a common elevation, and are composed of three joints, of which the first two are very short, the last long, and divided into two branches. The mesothorax is prolonged like a scutellum; the abdomen cylindrical, and of eight or nine segments; and the feet are almost membranous, compressed, of four joints, without hooks at the end. The four anterior ones are approximated before, and the other two thrown backwards. The wings have slight longitudinal nerves, and fold longitudinally like

a fan. The larvæ have a scaly head, live on hymenopterous insects, and are metamorphosed into a pupa formed by the skin, and preserving its primitive form. This order comprehends but two genera, *Stylops* and *Xenos*.

Gen. STYLOPS, Kirby.

Antennæ biarticulated at their base, divided into two elongated, compressed, unequal branches, of which the upper is jointed; abdomen retractile and fleshy.

S. melittæ, Kirby. Larva inhabits the bodies of some *Andrena*.
—*Lin. Trans.* xi. 112.

Gen. XENOS, Kirby.

Antennæ triarticulate at the base, and divided into two elongated, slender, semicylindrical, equal branches, without joints.

X. Rossii, Kirby. Black; antennæ with compressed branches; tarsi fuscous. Parasitical on the *Vespa Gallica*.—*Lin. Trans.* xi. 116.

X. Peckii, Kirby. Blackish fuscous; antennæ with semicircular branches, dotted with white; tarsi fuscous. Parasitical on the *Polistes fuscata* of Fabricius, in America.—*Lin. Trans.* xi. 116.

ORDER XI.—DIPTERA.

Six feet; two membranaceous extended wings, and a balancer under each in the greater number; a sucker composed of a variable number of scaly pieces in the form of setæ, either inclosed in the upper furrow of a sheath or inarticulated proboscis, terminated by two lips, or cased in one or two plates.

The teguments of the body in this order are generally thin and slightly coriaceous. The eyes are large, particularly in the males, and the head in the greater number has three ocelli. The proboscis is formed, first of a univalve sheath, folded above, and leaving between its margins a furrow or canal, terminated by two lips, and when these lips are much prolonged, presenting sometimes two bends or knees, one immediately before them, and the other near the base. 2. of an interior sucker composed of at least two setæ, representing the labrum and labium, of from four to six pieces in others, analogous to the terminal lobe of the jaws and to the mandibles. 3. maxillary palpi, but no labial ones. The thorax is formed in the greater number by the intermediate segment or mesothorax, the other segments of the trunk being very short. It has on each side two stigmata, but the anterior ones are often imperceptible. The abdomen is attached to the thorax by a portion only of its transverse diameter. It is composed of from five to nine apparent rings, and terminates in a point in the females. In those in which the number of segments is small, the last forms often a kind of ovipositor or oviduct. The sexual organs of the males are exterior in many species, accompanied by hooks or forceps, and folded under the belly. The legs are generally long and slender, and terminated in tarsi of five joints, of which the last has two hooks and very often two or three vesicular or membranous balls, which assist the insect to crawl in a vertical position upon polished substances. Sir Everard Home, in the Philosophical Transactions for 1816, has described the mechanism by which these and similarly constructed animals are enabled to walk contrary to the law of gravity. The wings in the Diptera are simply veined, extended, and almost always horizontal, the sides often ciliated at the base. Under these are placed two small moveable bodies, formed of a linear stalk, and terminated by a button or club, which are termed balancers (*halteres*), but of which the use is

not well ascertained. In many species above these balancers are found two appendages of a papyraceous consistence, generally white or yellowish, and resembling the valves of shells, attached together by one of their sides. One of these pieces is attached to the wings and participates in their movements. These appendages often conceal the balancers. The larvæ of the Diptera have no feet; but in some are found appendages which contribute to locomotion. Their mouth is generally furnished with two hooks. The orifices for respiration are principally at the posterior extremity of the body. Many of the insects of this order, such as the gnats and gadflies, are troublesome from their bite, and torment many of the domesticated animals. Others, as the *Æstri*, deposit their ova on the bodies of animals, upon which their larvæ feed. And some, in localities where they are exceedingly multiplied, destroy in this manner the young plants of the Cerealæ, and often annihilate the hopes of the husbandman. The duration of life in the Diptera is not long, in the perfect state being limited to a few weeks or months. All undergo a complete metamorphosis, but modified in two principal ways; some forming a cocoon, while in others the skin of the larvæ hardening becomes a solid covering, of an oval form, like a grain of seed or an egg, and presenting no exterior marks of the contained animal.

SECTION I.

Head always distinct from the thorax, large, or medium sized; hooks of the tarsi simple or unidentated; sucker inclosed in a sheath; larvæ with the body, and the cocoon, when it is formed of the skin, always annulated through its whole length.

FAMILY I.—NEMOCERA, Lat.

Antennæ composed at least of six joints; but generally from fourteen to sixteen; the larvæ with a scaly head, and changing their skin to pass into the pupa state.

The insects of this family, which composed the genera *Culex* and *Tipula* of Linnaeus, have an elongated body; the head small and rounded; the eyes large; the antennæ filiform or setaceous, longer than the head, often hairy; the trunk projecting, either prolonged in the form of a syphon or beak, or short, and terminated by two large lips; two exterior filiform or setaceous palpi, generally composed of five joints; the thorax thick, elevated, and gibbous; the wings oblong, and the balancers discovered; the abdomen elongated, commonly of nine rings, pointed in the females, and with forceps or hooks in the males; feet long and slender. Many of the smaller species assemble in numerous troops, and form airy dances while flying.

TRIBE I.—CULICIDES.

Trunk cylindrical, long, projecting, tumid at the end, and inclosing a sucker of six pieces; palpi directed forwards, and very hairy, at least in the males; antennæ filiform, the length of the head and thorax, of fourteen joints, plumose in the males; eyes lunate; wings close to the body, with longitudinal scaly nerves; legs long.

The larvæ are aquatic, and lose not the faculty of moving and swimming after having passed into the pupa state.

I. Palpi of the males, or both sexes, at least as long as the trunk.

Gen. CULEX, ANOPHELES.

II. Palpi short in both sexes.

Gen. ÆDES.

Gen. CULEX, Lin. Lat.

Antennæ setaceous, of about fourteen joints, furnished with hairs, which form a tuft in the males; rostrum long, inclosed.

ing a sucker of five pieces ; wings lying horizontally on the body with scales on the nerves.

The animals of this genus, well known for their avidity for blood, are the scourge of many countries. The gnats or mosquitoes, as they are termed, prevail in some places to such a degree as to make it necessary to secure the body from their attacks, even in the hours of repose. For this purpose in many of the warmer countries gauze curtains are necessary ; and in Lapland, where the species in summer are excessively multiplied, the natives are obliged to coat their face and hands with grease, and to burn fire round their dwellings, to avoid or moderate their attacks.

C. pipiens, Lin. The Gnat. Body cinereous ; segments of the abdomen with a transverse brown line ; wings transparent, with a slight obscure tint ; legs the colour of the body ; antennæ of the male plumose. 3 lines long. Europe. B.—*Shaw*, vi. pl. 109.

C. pulicaris, Lin. The Midge. Body slender and elongated ; antennæ plumose and forked at the extremity ; wings white, with three obscure points, from which arise as many paler transverse bands. About a line long. Inhabits Europe, in woods.—*Fab. Spec. ii.* 470.

C. equinus, Lin. Antennæ filiform ; head black, with the forehead whitish ; thorax black, with the sides cinereous ; abdomen blackish. Resembles a small fly. Inhabits Northern Europe, and attacks horses particularly.—*Fab. Spec. ii.* 470.

C. annulatus, Fab. Blackish, with the abdomen and feet ringed with white, and five blackish spots on the wings. Inhabits Europe.—*Nouv. Dict.* viii. 339.

TRIBE II.—TIPULARIÆ.

Rostrum sometimes very short, and terminated by two large lips, sometimes in the form of a syphon or beak more or less long, but directed longitudinally under the body ; sucker of two pieces ; palpi slightly hairy, generally bent, and always very short when elevated.

This tribe comprehends the genus *Tipula* of Linnæus. Their body is generally elongated ; the head round, with two large reticulated eyes ; the thorax tumid and round ; the wings much elongated ; the balancers long ; abdomen long and cylindrical ; legs long and slender in the greater number, and the tarsi terminated by two small hooks. They are distinguished at first sight from all the other Diptera by their slender body and wings and very long legs. The larger species are found in meadows and pastures from the commencement of spring till the end of autumn. The larvæ vary much in form and in the places which they inhabit. In general they resemble small worms, and are found in moist meadows, undergo their metamorphosis under ground, and are changed into pupæ of a grayish colour, with the segments rough with tuberosities. The larvæ of the smaller species are found in dung, mushrooms, or in water. Latreille divides this tribe into five sections.

I. Antennæ slender, filiform, or setaceous, sensibly longer than the head, at least in the males, of more than twelve joints in the greater number ; feet long and slender.

1. No ocelli.

A. Palpi always short ; anterior extremity of the head not prolonged into a rostrum ; wings close to the body or inclined, with a few nerves running longitudinally ; eyes lunate ; legs without spines. The smaller species live in the larva and pupa state in water or vegetable galls.

- a. Antennæ of the males plumose, or with a bundle of hairs ; those of the females hairy.

1. *Culiciformes*.

- * Antennæ of the males plumose on both sides, and to the end.

- † Antennæ entirely composed, in both sexes, of oval cylindrical joints.

Gen. CORETHRA.

- †† Antennæ of both sexes moniliform inferiorly, terminated afterwards either by a long and linear joint, or by two joints, of which the last is tumid and oval.

Gen. CHIRONOMUS, TANYPUS.

- ** Antennæ of both sexes almost entirely moniliform, with the last five joints more elongated ; those of the males having but one bundle of hairs at their base.

Gen. CERATOPOGON, MACROPEZA.

- b. Antennæ of both sexes moniliform, furnished with verticillated hairs, or simply pubescent.

2. *Gallicolæ*.

Gen. PSYCHODA, CULICOIDES, CECIDOMYIA, LASIOPTERUS.

- B. Palpi in many long, and the last joint elongated ; anterior extremity of the head narrowed and prolonged into a rostrum, often with a projecting point ; wings often distant, with numerous nerves, united transversely, at least in part, beyond the middle of their length ; two or three discoidal closed areolæ ; eyes round or oval, without remarkable notch ; extremity of the legs spinous. Species generally large, the greater part living in the larva and pupa state in the ground or in rotten wood.

3. *Terricolæ*.

- a. Antennæ of at least thirteen joints, sometimes bearded, pectinated, or serrated, in others more or less moniliform or knotty, and furnished with verticillate hairs.

- * Last joint of the palpi very long, and as if nodulous or jointed ; antennæ often bearded, pectinated, or serrated ; wings always extended.

Gen. CTENOPHORA, PEDICEA, TIPULA, NEPHROTOMA.

- ** Last joint of the antennæ scarcely longer than the others, not knotty ; wings generally resting on the body.

Gen. RHIPIDIA, LIMNOBIUS, ERIOPTERA, POLYMERUS.

- b. Antennæ of ten joints at most, slender or capillary, simply hairy or pubescent ; hairs not sensibly verticillate ; palpi and wings as in last division.

- * With wings.

Gen. TRICHOCERA, MÆKISTOCERA, DIXA, HEXATOMA, NEMATOCERA.

- ** No wings.

Gen. CHIONIA, Dalman.

2. Two or three ocelli ; eyes generally round, the odd ocellus the smallest ; antennæ simple ; last joint of the palpi never very long or knotty ; wings resting on the body ; spurs on the legs.

4. *Fungivoræ*.

- A. Antennæ not perceptibly granulated or perfoliated.

- a. Antennæ longer than the head and thorax, capillary.

Gen. MACROCERA, BOLETOPHILA.

- b. Antennæ not longer than the head and thorax.

- * Two ocelli.

Gen. SYNAPHUS, MYCETOPHILA.

- ** Three ocelli.

Gen. LEIA.

- B. Antennæ either granulated, nodose, or perfoliated.

- a. Antennæ of the same thickness, or slenderest towards the end.

* Snout prolonged like a beak.

Gen. ASINDULUM, RHYPHUS.

** Snout not rostriform.

† Eyes entire.

Gen. PLATYURA, SCIOPHILUS, CAMPILOMYZON.

†† Eyes notched.

Gen. MYCETOBUS, MOLOBRUS.

b. Antennæ in a perfoliated club, or almost rasp-shaped.

Gen. CEROPLATUS.

II. Antennæ of at most twelve joints, shorter than the head and thorax, thick, cylindrical, moniliform, or perfoliate; feet generally short; wings broad; three equal ocelli in the greater number.

5. *Florales.*

1. No ocelli.

Gen. CORDYLA, SIMULIUM.

2. With ocelli.

A. Antennæ of eleven joints.

Gen. SCATHOPSE, PENTHETRIA, DILOPHUS.

B. Antennæ with eight or nine joints.

Gen. BIBIO, ASPISTES.

Gen. CHIRONOMUS, Meig.

Rostrum very short, bilabiate; palpi bent; no ocelli; eyes elongated and approximated posteriorly; wings with only longitudinal ribs, slightly inclined; feet long, slender, the two anterior ones inserted near the neck, and longer than the others; antennæ filiform, those of the males furnished with tufted hairs; larvæ aquatic.

C. *plumosus*, Fab. Greenish, and the abdomen annulated with black; wings whitish, with a black point near their middle. 3 lines long. Europe, in marshy places.—*Nouv. Dict.* vi. 548.

Gen. PSYCHODA, Lat.—*Tipula*, Lin.

Rostrum in the form of a beak, shorter than the head; no ocelli; wings large, oval, inclined, pubescent and fringed; antennæ filiform, long, of from fifteen to sixteen globular joints, furnished with verticillate hairs; feet placed at equal distances.

P. *phalænoides*, Lat. Body cinereous, with the wings fringed and pendant, resembling a small phalæna. Inhabits Europe, in moist places.—*Nouv. Dict.* xxviii. 210.

Gen. TIPULA, Lat. Lin.*

Antennæ almost setaceous, simple, of thirteen joints, of which the first is the largest, and almost cylindrical, the second globular, the others cylindrical, the third elongated; eyes oval, entire; no ocelli; rostrum very short, terminated by two large lips; last joint of the palpi long and nodulous; wings

reticulated posteriorly ; legs long ; abdomen clavate in the males, and terminating in a scaly bivalve point in the females.

T. pratensis, Lat. Body black, with the front and spots on the thorax reddish brown ; abdomen of the female with spots of this colour on the sides. Inhabits Europe, in meadows, the larvæ destroying the roots of grasses.—*Fab. Spec. ii.* 403.

T. lunata, Fab. Cinereous, with a black line along the upper part of the abdomen ; wings cinereous, with a whitish marginal lunule. Inhabits Europe, in meadows.—*Fab. Spec. ii.* 402.

T. oleracea, Fab. Grayish brown, without spots, and the wings bordered exteriorly with brown. Inhabits Europe, in meadows.—*Fab. Spec.* 404.

FAMILY II.—TANYSTOMA.

Rostrum often long, wholly or in great part concealed ; sucker composed of six pieces ; larvæ with a scaly head, and changing their skin in passing into the pupa state.

TRIBE I.—TABANII, Lat.

Sucker of six pieces ; last joint of the antennæ destitute of a style or seta at the end, with from four to eight transverse divisions or rings ; rostrum very long, filiform in many, and entirely exterior ; wings always distant.

I. Last joint of the antennæ divided at the base into eight rings ; rostrum very long and pointed.

Gen. PANGONIA.

II. Last joint of the antennæ divided from nearly the middle into four or five rings ; rostrum of medium length, or short, terminated by a dilatation formed by the lips.

1. No ocelli.

Gen. TABANUS, HEMATOPOTA, HEPTATOMA.

2. With ocelli.

Gen. RHINOMYZA, SILVIUS, ACANTHOMERUS, CHRYSOPS, RAPHIORHYNCHUS.

Gen. TABANUS, Lat. Lin.

Sucker of six pieces, inclosed in a projecting bilabiated and membranous rostrum, upon which are two conical palpi ; antennæ scarcely longer than the head, of three pieces, of which the last is elongated, thick, and crescent-shaped inferiorly, subulate at the end, and in five rings ; head almost entirely occupied by the eyes, which are banded or spotted ; three small ocelli ; wings horizontal, distant, triangular ; abdomen conical ; tarsi with three strong tufts.

The insects of this genus resemble a large fly, and are dreaded by horses and black cattle during summer. They are very voracious and greedy of blood. They fly with rapidity, making a humming noise, when the weather is warm and the sun shines, and settle on the backs of cattle. It is the female alone, however, that is conceived to have this avidity for blood, the male being said to draw his nourishment from the honied juice of flowers.

T. bovinus, Lin. Head grayish white, with the eyes of a shining green when the insect is alive, and brown when it is dead ; thorax blackish ; abdomen blackish brown, with the sides of the segments and their posterior margins reddish brown, and a row of spots of the same colour, but paler on the middle of the back ; wings transparent, veined with brown ; feet blackish, with the legs reddish white. 11 lines long. Found in Europe in summer on oxen and horses.—*Nouv. Dict.* xxxii. 443.

T. autumnalis, Lin. Head gray ; thorax brown above, with whitish hairs on the sides, and five lines on the middle ; abdomen brown above, with a triangular spot on the middle of the wings, and a small rounded one on the sides ; wings transparent, veined with brown ; feet gray, with a large yellowish spot at the base of the legs. Inhabits Europe.—*Nouv. Dict.* xxxii. 444.

TRIBE II.—SICARII.

Rostrum often concealed in the greater part, and terminated by two projecting lips ; sucker composed of four pieces ; last joint of the antennæ destitute of style or seta, and with three transverse divisions.

Gen. CÆNOMYIA, CHIROMYZA, PACHYSTOMUS.

Gen. CÆNOMYIA, Lat.—*Tabanus*, Vill.—*Sicus*, Fab.

Antennæ of three pieces, of which the last is longest, conical, with eight rings or small joints ; rostrum projecting, short, terminated by two large lips, inclosing a sucker of four setæ ; palpi exterior ; wings resting on the body ; scutellum with two spines.

C. ferruginea, Lat. Reddish, with the scutellum bidentate, and whitish spots on the sides of the abdomen, this last part being blackish in the male.—*Lat. Gen.* iv. 281.

TRIBE III.—MYDASII, Lat.

Palpi not exterior or wanting ; last joint of the antennæ terminated in a style or ovoid club, divided transversely in two, with an umbilicus at the end, in the form of an elongated cone, or subulate.

Gen. MYDAS, THEREVA.

Gen. MYDAS, Fab. Lat.

Antennæ longer than the head, with the third and last joint ovoid, elongated, and terminated in a club, and an indistinct style inclosed in an umbilicus at its extremity.

M. flatus, Fab. Body black, with the sides of the second segment of the abdomen transparent ; wings obscure blue ; posterior thighs serrated. Inhabits North America.—*Nouv. Dict.* xxii. 108.

TRIBE IV.—LEPTIDES.

Palpi exterior ; antennæ always very short, of almost equal thick-

ness, granulated or almost moniliform, and terminated by a seta.

Gen. LEPTIS, ATHERIX, CLINOCERAS.

Gen. ATHERIX, Meigen.

Antennæ moniliform, with the seta on the last joint lateral ; palpi elevated.

A. maculatus, Meig. Wings with two black bands. Inhabits Europe.—*Nouv. Dict.* iii. 54.

TRIBE V.—DOLICHOPODA, Lat.

Rostrum very short, terminated by two large lips with the palpi lying on them, or prolonged in the form of a small beak ; last joint of the antennæ flattened, and with a seta ; wings resting on the body.

Gen. DOLICHOPUS, (*Satyra*, Meig. ;) MEDETERES, (Fischer ;) PLATYPEZA, CALLOMYIA, ORTHOCHILE.

Gen. DOLICHOPUS, Lat.—*Musca*, Lin.

Rostrum short, bilabiated and fleshy ; sucker of many setæ ; palpi often flat, projecting and resting on the trunk ; antennæ of three pieces, of which the second and third are generally united, and appearing as if one, the last large, globular, oval or fusiform, and compressed ; a lateral or terminal seta.

D. unguatus, Lat. Seta of the antennæ lateral ; body green or bronze green ; rings without spots ; feet partly of a livid red. 3 or 4 lines long. Inhabits Europe.—*Nouv. Dict.* ix. 531.

TRIBE VI.—ASILICI, Lat.

Mouth almost always bearded ; last joint of the antennæ elongated, fusiform, or clavate, and terminated generally by a style or a thick and stiff hair ; body oblong ; thorax narrowed before.

The insects of this and the following tribes have the trunk entirely or almost entirely projecting, in the form of a syphon or beak, sometimes cylindrical or conical, sometimes long, slender, or filiform ; lips rarely forming a terminal head ; palpi invisible, or very small ; last joint of the antennæ never in the form of a flattened seta.

I. Mouth bearded ; head not globular nor entirely occupied by the eyes, even in the males.

1. Tarsi terminated by two balls or hooks.

A. Last joint of the antennæ clavate, without style or seta.

Gen. LAPHRIA, CERATURGUS.

B. Last joint of the antennæ terminated by a style or seta.

Gen. DIOCTRIA, DASYPOGON, ASILUS, ANCYLORHYNCUS.

2. Tarsi terminated by three hooks, without intermediate balls.

Gen. GONYPES.

II. Mouth beardless ; head almost globular, entirely occupied by the eyes.

Gen. OEDALIA.

Gen. ASILUS, Lat. Lin.

Antennæ the length of the head, separated at their origin, the

first joint longer than the second, and the third or last in the form of an elongated almost cylindrical cone, pointed at the end, and terminated by a distinct style or seta, with an articulation at the base.

These insects have the abdomen in the form of an elongated cone, much pointed in the females, with the feet robust. They appear generally towards the end of spring or autumn. Some are found on the ground in dry or sandy places, and others among trees or cut wood.

A. crabroniformis, Lin. Head covered with reddish brown hairs; thorax yellowish brown, with two small brown lines; three first rings of the abdomen black, the others fawn-coloured; wings yellowish, spotted with brown at their extremity; feet yellow, with the thighs brown. One inch long. Inhabits Europe.—*Shaw*, vi. pl. 112.

A. forcipatus, Lin. Gray cinereous, with a longitudinal band on the thorax; antennæ, rostrum, and extremity of the abdomen black; balancers yellow; wings obscure; feet obscure brown. 7 lines long. Inhabits Europe, in gardens and woods.—*Shaw*, vi. pl. 112.

TRIBE VII.—HYBOTINI, Lat.

Mouth beardless; head globular, entirely occupied by the eyes in the males; last joint of the antennæ lenticular, with an elongated seta in the form of a hair.

Gen. HYBOS, OCYDROMYA, DAMALIS.

Gen. HYBOS, Lat.

Antennæ much shorter than the head, inserted on the fore part and composed of two joints, with a long seta at the extremity; palpi bent upwards; thighs of the last pair of feet tumid.

H. funebris, Lat. Deep black; wings obscure, with a black marginal spot; posterior thighs large and serrated below. Inhabits Europe.—*Nouv. Dict.* xv. 433.

TRIBE VIII.—EMPIDES, Lat.

Rostrum projecting, almost cylindrical and perpendicular, inclosing a sucker; antennæ of two or three principal pieces, the last without divisions; body elongated; balancers naked; head rounded; abdomen cylindrical or conical; feet long.

The insects of this tribe are of small size, and live on prey or flowers. Their antennæ are short, and always terminated by a seta; and the rostrum often long.

I. Antennæ of three joints.

1. First joint of the antennæ long and conical.

A. Rostrum much longer than the head.

Gen. EMPIS, RHAMPHOMYIA.

B. Rostrum scarcely longer than the head.

Gen. HILARIS, BRACHYSTOMA.

2. Last joint of the antennæ globular.

Gen. GLOMA.

II. Antennæ of two joints, the last almost globular or ovoid, and terminated by a seta.

Gen. HEMERODROMUS, SICUS, DRAPETIS.

Gen. EMPIS, Lat.

Rostrum projecting, almost cylindrical or perpendicular; sucker of four setæ; antennæ of three pieces, the last conical, subulate, and terminated by a stiff point; head small, rounded; eyes large; thorax rounded; wings oval, generally longer than the abdomen; balancers elongated, terminated in a rounded button; abdomen cylindrical or conical; legs long.

E. livida, Lat. Lin. Livid cinereous, with some black hairs; thorax with three longitudinal black lines; feet obscure fawn-coloured, with the tarsi black; wings transparent, with the base reddish. 4 lines long. Inhabits Europe, in fields and gardens.—*Shaw*, vi. pl. 110.

E. borealis, Lin. Body black, without spots; thorax thick, elevated; abdomen slender, elongated, pointed at the extremity, that of the male terminated by two hooks, of the female by two moveable pieces; wings very large, obscure brown; legs and tarsi black. 5 lines long. Northern Europe.—*Shaw*, vi. pl. 110.

TRIBE IX.—ANTHRACII, Lat.

Body short and broad, not raised on the back; wings distant; head exactly applied against the thorax, and on the same level.

1. Rostrum long, projecting.

Gen. CORSOMYZA, MULIO, NEMESTRINA, FALLENIA.

2. Rostrum scarcely longer than the head.

Gen. HERMONEURA, ANTHRAX, STYGIS, TOMOMYZA.

Gen. ANTHRAX, Fab. Lat.—*Musca*, Lin.

Palpi interior; rostrum slightly projecting; antennæ with the first joint longer than the second, pear-shaped, and terminated abruptly in a long awl-shaped elongation, with a very distinct style.

The insects of this genus are small, fly with much lightness, and are found on flowers. The wings are transparent and colourless, or opaque and coloured.

A. morio, Lat. Body black, hairy, with two white spots formed by the hairs at the extremity of the abdomen; wings blackish brown, with the extremity white and transparent, and the feet black. Six lines long. Inhabits Europe.—*Nouv. Dict.* ii. 159.

TRIBE X.—BOMBYLIARII, Lat.

Head low, and the thorax elevated and gibbous; balancers naked; abdomen triangular or oblong; rostrum directed forwards; antennæ approximated at their base, generally terminated by a seta and without a style.

1. Abdomen cylindrical or oval.

1. First joint of the antennæ longest.

Gen. TOXOPHORA, XESTOMYZA.

2. First joint of the antennæ the length of the last and often shorter.

Gen. APATOMYZA, THLIPSOMYZA, AMYCTES, GERON, PHTHIRIA, CYLLENIA, (rostrum short.)

II. Abdomen short, triangular.

Gen. PLOAS, BOMBYLIUS, USIA, LASIA.

Gen. BOMBYLIUS, Lin.—*Asilus*, Geoff.

Rostrum longer than the head ; antennæ of three joints, the third the longest, slender towards the end and terminated in a small style, the second shortest ; body broad, hairy, with the head rounded and almost occupied by the eyes ; three small ocelli placed in a triangular form on the summit ; wings large, horizontal ; abdomen flattened, triangular and broad ; feet long and slender.

The insects of this genus are very agile, and fly with much rapidity. They hover over flowers without alighting, and introduce their long rostrum to suck the honey. In flying they make a humming noise.

B. *major*, Lat. Body short, covered with yellowish gray hairs ; rostrum black, pointed, as long as the body ; wings long, whitish, transparent at the anterior margin and extremity, brown from the base to near the extremity of the exterior border, forming a large waved spot on the middle of the wing ; feet long, gray, with blackish spines ; tarsi black. 6 lines long. Inhabits Europe.—*Shaw*, vi. pl. 113.

B. *medius*, Lin. Body covered with long reddish hairs ; antennæ, rostrum, and feet black ; legs covered with spines of the same colour ; wings half brown and half white, with small obscure spots. Inhabits Europe.—*Shaw*, vi. pl. 113.

TRIBE XI.—VESICULOSA, Lat.

Head inclined and the thorax elevated ; balancers covered by a plate ; abdomen inflated and vesicular ; antennæ sometimes very small, of two joints, with a terminal seta, or of three joints, of which the last, destitute of style or seta, is elongated or cylindrical, or tumid and in the form of a button.

I. With a rostrum.

Gen. PANOPS, CYRTUS.

II. Without a rostrum.

Gen. ASTOMELLA, ACROCERA, OGEODES.

Gen. PANOPS, Lam.

Rostrum elongated and cylindrical, extended horizontally under the body, with two projecting palpi, filiform and biarticulated, at the base ; antennæ of three joints, cylindrical, projecting, a little longer than the head, the two first joints short, the last long, and without apparent division.

P. Baudini, Lam. Body black, with the knees and end of the legs whitish ; ocelli indistinct ; antennæ entirely black, and the last joint slenderest at its extremity. 6 lines long.—*An. Mus.* iii. pl. 22, fig. 3.

FAMILY III.—NOTACANTHA.

Sucker of two pieces ; rostrum in the greater part membranous, short, concealed, with the exception of the two large lips by which it is terminated ; in others long, slender, in the form of a syphon, and concealed by a beak bearing the antennæ, of which the last joint is divided into many rings, the form and length of these organs varying ; wings resting on the body, and with a central radiated areola.

The insects of this family were placed by Linnæus in his genus *Musca*. Their body is oblong and depressed ; the antennæ often cylindrical or conical, and sometimes terminated in a club ; the head hemispherical and almost entirely occupied by the eyes in the males ; eyes often agreeably coloured, and with three smooth ocelli. The wings are long, crossed horizontally on the body, with the nerves disposed in rays ; the scutellum often armed with teeth or spines ; the abdomen large, oval or rounded, and the legs short. The greater part of the family inhabit marshy places ; others are found on flowers and the leaves of vegetables, or frequent woods. The larvæ are aquatic, and their body is terminated by a tail formed by the posterior segments, and proper for respiration. The skin serves for a cocoon to the pupa, but without changing its form.

TRIBE I.—XYLOPHAGEI.

Last joint of the antennæ divided into eight rings.

Gen. HERMETIA, XYLOPHAGUS, BERIS, CYPHOMYA.

Gen. XYLOPHAGUS, Meigen, Fab.

Antennæ as long as the head and half of the thorax, with the last joint cylindrico-conical, and terminated in a point ; palpi exterior ; body narrow and elongated ; scutellum without spines.

X. ater, Meigen. Body of a deep black, with the feet yellowish or reddish, and an obscure band on the wings. Inhabits Europe.—*Nouv. Dict.* xxxvi. 330.

TRIBE II.—STRATIOMYDES, Lat.

Last joint of the antennæ with at most five or six rings, not including the style.

I. Last joint of the antennæ annulated, and often terminated by a style or seta.

1. Antennæ flabelliform.

Gen. PTILOCERA.

2. Antennæ simple.

A. Last joint cylindrical or fusiform, or in the form of an elongated cone ; sometimes without appendage at the end, or terminated by a style or stiff bristle ; scutellum often dentated or spinous.

a. Rostrum very short, membranous, terminated by two large projecting lips before the head, not advanced like a beak, but bearing the antennæ.

Gen. EPHIPIUM, (*Clitellaria*, Meig.) STRATIOMYS, OXYCERA.

- b. Rostrum long, slender, filiform, retracted into the lower cavity of an anterior projection in the form of a beak and bearing the antennæ.

Gen. NEMOTELUS.

- B. Last joint of the antennæ forming a globular or oval club, with a long seta at the end ; scutellum generally unarmed.

Gen. CHRYSOCHLORUS, SARGUS, VAPPO.

- II. Last joint of the antennæ inarticulate, without style or seta.

Gen. SCENOPINUS.

Gen. STRATIOMYS, Geoff. Lat.—*Musca*, Lin.

Sucker of at most two setæ, received into a very short, retractile, bilobate, and membranous sheath ; antennæ of three principal pieces, longer than the head, the second and third pieces forming a compressed fusiform body of about six joints, terminated in a point, without style or seta ; head hemispherical ; thorax cylindrical ; scutellum armed with two points ; wings long, resting upon one another ; abdomen widened in the middle ; tarsi with three balls.

- S. *chamæleon*, Geoff. Head yellow ; eyes brown ; antennæ black ; thorax brown, covered with fawn-coloured down ; scutellum yellow, with two points of the same colour ; abdomen blackish brown above, with seven spots of deep yellow, three on each side and one at the extremity, and bordered by a black ring ; feet yellow and the thighs brown. Europe, on flowers.—*Shaw*, vi. pl. 105.

FAMILY IV.—ATHERICERA.

Sucker of two or four pieces, the two contiguous ones with palpi, retracted with the sucker into a furrow of the trunk.

TRIBE I.—SYRPHIÆ.

- I. Antennæ longer than the head.

1. No nasal prominence.

Gen. APHRITIS, (*Microdon*, Meigen,) CERATOPHYA, (Wiedem.)

2. A nasal prominence.

Gen CERIA, CALLICERA, SPHECOMYIA, CHRYSOTOXUM.

- II. Antennæ almost as long as the head, supported on a common pedicle or separate, but with their two first joints equal ; a nasal prominence.

Gen. PARAGUS, PSARUS.

- III. Antennæ much shorter than the head.

1. Antennæ of three joints.

- A. Snout rostriform, projecting ; proboscis very long.

Gen. RHINGIA.

- B. Snout not projecting or very short ; proboscis of medium length.

- a. Antennæ with a plumose or hairy and three jointed seta.

Gen. VOLUCELLA, SERICOMYIA, ERISTALIS, BRACHYOPUS, PELOCERA.

- b. Seta of the antennæ simple and not jointed.

- * A nasal prominence.

Gen. MALLOTUS, HELOPHIUS, SYRPHUS, DOROS, BACCA, CHRYSOGASTER, PSILOTE.

** No nasal prominence.

Gen. MILESIA, EUMENOS, TROPIDIAS, PIPIZA, XYLOTES, SPHEGINE, MERODON, ASCIA.

2. Antennæ of two joints, the last subulate at the extremity.

Gen. PIPUNCULUS. (The genus *Cephalops* of M. Fallen is identical Latreille conceives with this.)

Gen. SYRPHUS, Oliv. Lat.—*Musca*, Lin.

Proboscis much shorter than the head and thorax; anterior prolongation of the head or snout short and very obtuse, with a small eminence above; wings distant; antennæ perceptibly shorter than the head, almost parallel, the last joint orbicular or almost ovoid, with a simple seta or slightly plumose.

The larvæ of this genus inhabit trees or plants upon which aphides abound, which they destroy in great numbers. They resemble a membranaceous worm, flattened below, pointed at the anterior extremity, the posterior extremity thick and rounded. Their colour is greenish or yellowish, with a line of a different colour along the middle of the back.

S. ribesii, Lat. Head yellow and eyes reddish brown; thorax bronze-coloured, with the scutellum and hairs yellow; abdomen black above, with four transverse yellow bands, of which the first is interrupted; feet yellow, spotted with black. Inhabits Europe, on gooseberry bushes.—*Nouv. Dict.* xxxii. 326.

TRIBE II.—CONOPSARIÆ, Lat.

Proboscis projecting, in the form of a syphon, and either cylindrical, conical, or setaceous.

I. Body narrow and elongated; second joint of the antennæ as long or longer than the third, and forming with it a fusiform ovoid or compressed club.

Gen. CEPHENE, (in place of *Systrophus*, already employed;) CONOPS, ZODION, MYOPA.

II. Body short; second joint of the antennæ much smaller than the third, which is ovoid and flattened.

Gen. BUCENTES, STOMOXYS.

Gen. CONOPS, Lin. Lat.

Antennæ the length of half the thorax, straight, clavate or nearly so, of three joints, the second very long, cylindrical, the last short, conical, and terminated in a small point; proboscis geniculate at the base, of three joints, projecting, inclosing two setæ, which form the sucker; inferior seta much longer than the upper; no palpi or ocelli.

The insects of this genus have a large almost hemispherical head, broader than the thorax, having at its anterior and inferior part a cavity to receive the proboscis. The thorax is short and cubical, with the humeral angles projecting; the abdomen elongated, slender at its base, recurved and tumid at the extremity; feet long and slender; tarsi with two hooks and two balls at the end; wings as long as the abdomen, narrow and distant, and the balancers elongated. They are extremely voracious animals, and are found in gardens and meadows.

C. rufipes, Fab. Antennæ black; head yellow; eyes brown; thorax black, with an elevated and yellow point on each side of the

anterior part ; sides and posterior margin ferruginous ; abdomen slender and ferruginous at the base, black and tumid at the extremity, with the margins of the rings ferruginous ; wings transparent, with the exterior margin obscure from the base two-thirds of the length ; balancers pale yellow. 6 lines long. Inhabits Europe.—*Nouv. Dict.* vii. 459.

TRIBE III.—ÆSTRIDES.

Buccal cavity sometimes inclosed by the skin, presenting two tubercles, at others consisting in a small cleft ; proboscis in those in which it is perceptible excessively small ; two palpi in some, either isolated or accompanying the proboscis ; antennæ very short, inserted in a bilocular cavity.

The Æstrides resemble the domestic fly in appearance, but the body has generally coloured bands. The larvæ live either on the exterior or within the skin of herbivorous mammalia, and sometimes upon man. When about to change into the pupa state, they quit their dwelling, and conceal themselves in the ground or at its surface.

I. With a proboscis.

Gen. CUTEREBRA, CEPHENEMYIA.

II. Without a proboscis ; two palpi.

Gen. ŒDEMAGENA.

III. Neither proboscis nor palpi ; a buccal cleft.

Gen. HYPODERMA.

IV. Neither proboscis nor palpi ; buccal cavity short ; two vestiges of palpi on the membrane.

Gen. CEPHALEMYYIA, ŒSTRUS.

Gen. ŒSTRUS, Lin. Lat.—*Gasterophilus*, Leach.

Wings with all the hinder cells terminal ; thorax smooth ; extremity of the abdomen inflexed, in the female much elongated and attenuated ; eyes distant.

The larvæ inhabit the stomachs of herbivorous quadrupeds, and are called *Bots* ; the perfect insects *Bot-flies*.

Œ. *equi*, Fab. Head yellowish white, with an impression in the form of an angle on the vertex, and including the smooth ocelli ; thorax yellowish, with two bundles of elevated hairs upon a blackish point ; abdomen reddish, with two blackish spots ; wings with a band in the middle and two small blackish points at the extremity. Inhabits Europe. B.—*Shaw*, vi. pl. 102.

The female deposits her eggs on the legs and shoulders of horses, parts which are often licked by the animals, and are thus taken into the stomach.

TRIBE IV.—MUSCIDES, Lat.

Antennæ of two or three joints, generally of three, the last flattened, with a simple or plumose seta on its back near the base ; proboscis membranous, bilobiate, geniculate, retracted into the buccal cavity in repose, and inclosing in a groove above a sucker of two setæ.

The Muscides, forming part of the Linnæan genus *Musca*, have the general appearance of the domestic fly. Their head is hemispherical, with large reticulated

eyes, and three small ocelli. The fore part of the head is generally more membranaceous than the hind part, of a different colour, with a longitudinal furrow on each side, or a groove to receive the antennæ, which are generally inclined, shorter than the head, and the last joint longer than the other two. The thorax is cylindrical and of one apparent segment; wings large, horizontal; the balancers short, and their appendages very large in many; abdomen triangular or oblong, sometimes almost cylindrical; feet with two hooks or balls, and the legs in many spinous. The larvæ are without feet, elongated, cylindrical, soft and flexible, and feed on different animal and vegetable substances. Those which feed on dead animals or putrid matters serve the great purpose of nature in clearing the earth from offensive and hurtful remains. One species deposit their larvæ in cheese, and these have the faculty of leaping to a small distance; others give birth to living larvæ.

I. With wings.

1. *Cryptogastræ*.

Scutellum covering the upper part of the abdomen.

Gen. CELYPHE, (Dalman.)

2. *Creophilæ*.

Scales of the balancers large, nearly covering them; wings generally distant.

A. Sides of the head not prolonged in the manner of horns bearing the eyes.

a. Wings distant.

* Antennæ elongated or of medium size.

Gen. ECHINOMYIA, OCYPTERA, (*Eriothrix*, *Exorista*, *Cylindromyia*, Meig.);
MUSCA.

** Antennæ one-half shorter than the head.

Gen. PHASIA, TRICHOPODUS, (*Thereva lanipes*, F.); IDIA, METOPIA,
MELANOPHORA.

b. Wings resting on the body.

Gen. LISPE.

B. Sides of the head prolonged into horns bearing the eyes.

Gen. ACHIAS.

3. *Carpomysæ*.

Appendages of the balancers small; balancers naked; wings distant, vibratile; antennæ always short.

Gen. PLATYSTOMA, TEPHRITIS, DICTYA, DACUS, MICROPEZA.

4. *Dolichocera*.

Scales of the balancers small; balancers naked; wings generally resting on the body; antennæ as long at least as the front of the forehead.

Gen. LOXOCERA, LAUXANIA, SEPEDON, TETANOCERA.

5. *Gonocephalæ*.

Scales small; balancers naked; wings resting on the body; antennæ shorter than the front of the head; head seen below, flat, almost triangular.

Gen. OTITES, OSCINIS, CALOBATA, NERIUS.

6. *Scathophilæ*.

Scales small; balancers naked; wings resting on the body in repose; antennæ shorter than the front of the head; head almost globular or transverse.

A. Eyes and antennæ at the extremity of two lateral prolongations in the form of horns.

Gen. DIOPSIS.

B. Head not laterally prolonged.

a. Antennæ inserted between the eyes.

* Anterior feet for seizing.

Gen. OCTHERA.

** All the feet simply for walking.

Gen. ANTHOMYIA, MOSILLUS, SCATHOPHAGA, THYREOPHORA, SPHÆROCERA.

b. Antennæ inserted near the buccal cavity.

Gen PHORA.

II. Destitute of wings.

7. *Aptera*.

Gen. CARNUS.

Gen. MUSCA, Lin. Lat.

Scales large, covering the greater part of the balancers ; wings distant ; palpi filiform, or slightly thicker at their upper extremity ; antennæ almost as long as the anterior face of the head, the third joint much longer than the first two, with a seta often plumose.

The insects of this genus are found in fields and houses. They fly with rapidity, making a humming noise, produced, it is believed, by the friction of their wings against the sides of the thorax. Those which are found in apartments, and named domestic flies, crowd upon every species of food, particularly those which contain sugar. They destroy the gilding and ceilings of apartments by their excrements, and the whole genus, whose habits are chiefly carnivorous, annoy men and cattle.

M. vomitoria, Lin. Common Blue-bottle Fly. Head yellowish, golden white ; eyes brown ; thorax black ; abdomen thick and short, of a deep brilliant blue, and with long black hairs around ; legs black ; wings a slightly blackish tint. Europe.—*Shaw*, vi. pl. 107.

M. carnaria, Lin. Head golden yellow at its anterior part ; eyes reddish ; antennæ plumose ; all the body strewed with black hairs ; thorax gray, with four longitudinal black lines ; abdomen black, shining, with four whitish square spots on each segment ; extremity of the last segment reddish ; feet black, hairy ; wings with a slight tint of black. 6 lines long. Inhabits Europe, depositing its larvæ alive on meat.—*Nouv. Dict.* xxi. 439.

This species is viviparous, and produces living young upon meat and dead animal matter. In six or seven days the larvæ are full grown, and about seven lines long. They enter the ground to undergo their change into pupæ ; their skin forms a cocoon of an oblong form and brown colour ; and in fifteen or eighteen days after this metamorphosis the perfect insect appears.

M. domestica, Lin. Antennæ black, with an elongated and flattened termination and lateral bearded seta ; eyes reddish brown ; fore part of the head satiny white, the rest black ; thorax black cinereous, with four longitudinal blackish bands ; abdomen blackish brown above, with blackish, elongated spots, and below of a pale yellowish brown ; feet black. Inhabits Europe, in houses, &c.—*Nouv. Dict.* xxi. 440.

M. meridiana, Lin. Antennæ plumose, black ; body shining black ; an elongated spot of golden yellow on each side of the head near the eyes ; abdomen short, thick, furnished, as well as the thorax, with some stiff black hairs ; wings yellow from their origin to near the middle and along the exterior border, the remainder white and transparent. 5 lines long. Inhabits Europe,—the larvæ in cow-dung.—*Nouv. Dict.* xxi. 440.

M. serrata, Lin. Head cinereous, whitish before and red in the

forehead ; abdomen ferruginous, elongated, conical, terminated in the female by a long perforator ; feet pale yellow, or ferruginous. Inhabits Europe.—*Nouv. Dict.* xxi. 441.

SECTION II.

The proboscis in this section consists of a sucker of two setæ, arising from the interior of the buccal cavity, and covered by two plates or palpi in place of a sheath. The ordinary sheath, or the part analogous to the lip, is wanting or only rudimentary. Sometimes the head is received posteriorly into a notch of the thorax, or almost fixed to it ; in other cases it appears under the form of a tubercle inserted vertically upon the thorax. The hooks of the tarsi seem double or triple. Many are destitute of wings. The larvæ live in the interior of the parent, and when extruded pass immediately into the pupa state. The cocoon formed by the primitive skin resembles a bean, with a rounded space at one of the ends of a darker colour. The perfect insect lives on mammalia and birds. Its skin is elastic, and resists ordinary pressure.

FAMILY V.—PUPIPARÆ.

TRIBE I.—CORIACEÆ.

Many have wings ; head and eyes of ordinary form and size ; thorax square.

I. With wings and balancers.

Gen. HIPPOBOSCA, ORNITHOMYIA.

II. Wings none or imperfect ; no balancers.

Gen. MELOPHAGUS.

Gen. HIPPOBOSCA, Lat.

Body oval, flattened, covered in the greater portion with a coriaceous elastic skin ; head small, rounded, horizontal and attached to the thorax by a neck ; antennæ inserted near the mouth, and each lodged in a cavity ; eyes large, oval, on the sides of the head ; sucker filiform and projecting ; thorax large ; scutellum transverse ; wings large, horizontal, with strong nerves near the sides ; abdomen soft, not distinctly annulated ; feet short.

H. equina, Lin. Eyes blackish ; head yellow, flattened ; thorax coloured brown and yellow ; abdomen broad, short, yellow, with brownish spots ; under part of the body pale yellow ; wings white, transparent, much longer than the body, and rounded at the extremity ; all the body slightly covered with hairs. 5 lines long. Inhabits Europe, on horses, oxen, and dogs.—*Shaw*, vi. pl. 114.

These animals suck the blood of horses, and horned cattle, and are often found upon the dog. They attack the parts least covered with hair.

TRIBE II.—PHTHYROMYIÆ.

Body always apterous ; head very small, and in the form of a capsular tubercle implanted on the thorax ; eyes small, granulated ; thorax semicircular.

Gen. NYCTERIBIA, Lat.

Head distinct from the thorax ; two short antennæ, of two joints,

of which the last is large, triangular, but rounded exteriorly; eyes slightly projecting, granular; thorax flat and semicircular, middle of the back with a longitudinal cavity terminating posteriorly in an elevation; abdomen ovoid or oval, with from six to eight segments; feet inserted high on the thorax, with a cavity on each side between the first and second pairs for the admission of air.

N. Blainvillii, Lat. (*Phthiridium*, Leach.) Deep chestnut brown, with the feet paler; thighs and legs almost cylindrical; under part of the thorax granulated, with two rows of long teeth at its upper and lateral extremity. 2 lines long. Inhabits Isle of France.—*Nouv. Dict.* xiii. 133.

N. vespertilionis, Lat. Upper part of the body and feet reddish yellow; below the thorax of a reddish brown, with a black line in the middle; thighs and legs much compressed, almost elliptical, the two rows of teeth on the lateral and upper extremity of the thorax short. Inhabits Europe, on the horse-shoe Bat.—*Leach, Zool. Mis.* iii. pl. 144.

Fossil Insects were arranged by Linnæus under the term *Entomolithus*, which was applied to petrifications including vestiges of insects and the Crustacea. The remains of true insects found in a fossil state are few in number, and are met with only in the later alluvial formations. Of those found in amber a good many species have been determined; but all of genera peculiar to the countries where this substance occurs. The amber itself, being chiefly found in beds of fossil wood or lignite, may have had a similar origin with the copal amber which exudes from the *Vateria Indica* of Linnæus when cut, and which while fluid envelopes the insects which happen to alight on it. The insects inclosed in the amber collected on the coasts of the Baltic sea were found by Latreille not to be penetrated by that substance; but that in all cases where the animal was of medium size the body was always hollow. The irregular position of these insects in the amber corresponds exactly to what is observed when a fly falls into a fluid of the consistence of syrup or liquid gum. The comparatively recent envelopement of insects in amber is further corroborated by the amber of different localities inclosing only insects proper to that geographical range; and the beds of fossil wood which accompany the presence of this substance, have been conceived to be of a structure corresponding to that of trees producing resin.

DIVISION IV.—RADIATA.

THIS division of the Animal Kingdom comprehends a great number of beings, of organization more simple than the preceding classes. However different otherwise in their structure or form, they seem (according to Cuvier) to correspond in the character of having all their parts disposed around a common axis in two or more rays, or in two or more lines extending from one extremity to the other. Even the intestinal worms have at least two tendinous lines or nervous threads arising from a circle round the mouth; many have four suckers around a prominence in the form of a proboscis; and notwithstanding some irregularities, there is always found in the animals arranged under this division traces of a radiated form, indistinctly marked in some, but in others, such as the *Asteriæ*, the *Echini*, and the *Polypi*, strikingly perceptible.

The nervous system in the animals of this division is never very evident; and of a circulation by vessels, as in the previous classes, there is no trace. The *Holothuriæ* have two vascular appendages, one attached to the intestines, and corresponding to the organs of respiration, and the other serving for the inflation of organs analogous to feet. The last of these only appears distinctly in the *Echini* and the *Asteriæ*. In the gelatinous substance of the *Medusæ* are seen tubes more or less complicated, connected with the intestinal canal; but none of these appearances are conceived to have any strong analogy with the circulating vessels of the higher animals.

Some genera, such as *Holothuria*, *Echinus*, and many intestinal worms, have a mouth and anus, with a distinct intestinal canal; others have an internal pouch, with only one opening, serving the purposes of a mouth and anus; but in the greater number there is only to be discovered a hollow cavity in the substance of the body, opening sometimes by many suckers or pores. Finally, in the lowest races of the animal kingdom, even this simple organization disappears, and nutrition seems to be accomplished by absorption, in the manner of vegetables.

In regard to their reproduction, sexes have been observed in many of the intestinal worms; others are hermaphrodite and

oviparous ; and some seem to be reproduced by *gemmae* or buds, or simply by a division of their parts.

The conglomerated or compound arrangement of animals, of which some examples occur among the Mollusca, is a common circumstance among the Radiated Animals, particularly among those named *Polypi* ; and from their aggregation and expansion into trunks and branches of various forms, joined to the simplicity of the organization in the greater number of the species, originated the term *Zoophyta*, or *animal plants*. The radiated disposition of their organs, like the petals which form corolla of a flower, seems also to have led to this idea. Indeed the boundary line between the animal and vegetable kingdom seems at first view to be but indistinctly drawn ; and there are objects in both which even accurate observers are scarcely able to decide, whether they belong to the one or the other. In the simplest being, however, the globular form, as Carus observes, is the characteristic of animality ; and minute microscopical investigation detects in the lowest of the animal races a semifluid mass, composed of minute globules suspended in slimy fluids, while in the vegetative organization the cellular texture always predominates. To this characteristic form the most imperfect animated beings add a sensibility to the faintest impressions, that of light, for example, the power of voluntary motion either in the animal or its parts, and the absorption of food into an internal cavity. In the more perfect animals the osseous skeleton serves to cover and protect the central nervous masses, and to support the organs of motion ; but in the simple structure of the lower animals, the frame-work serves only the last of these purposes, being either external to the animal substances, as in the *Tubipora* and Sponges, or internal, as in the *Sertularia*, *Gorgonia*, &c.

The animals of this division have been arranged in five classes, viz.

I. ECHINODERMATA, or animals with a crustaceous covering, distinct intestinal canal, and organs for generation, respiration, and partial circulation.

II. ENTOZOA, or intestinal worms ; elongated and depressed animals which have no organs for respiration or circulation.

III. ACALEPHA. Animals of a circular and radiated form, and destitute of circulating and respiratory organs.

IV. POLYPI or Zoophytes; comprehending all those small, gelatinous, and compound or aggregated animals which have a mouth surrounded by tentacula, and conducting into a simple stomach.

V. The INFUSORIA, or those smaller beings only known through the medium of the microscope, which are found in stagnant waters. The greater part of these have a gelatinous body, and are destitute of viscera, though some of the species possess visible organs of movement and a stomach.

CLASS X.—ECHINODERMATA.

Body suborbicular, with a coriaceous or crustaceous covering, radiated, destitute of head, eyes, and articulated feet; mouth inferior, simple, or multiform; organs of digestion compound; exterior tubes or pores for respiration.

THE animals of this class were arranged by some of the older naturalists among the testaceous Mollusca; by others among the Zoophytes; while others considered them as allied to the Crustacea. The more modern writers, however, founding their divisions on the comparative structure of the animals, as well as their external characters, have placed the animals of this group in a separate class, Cuvier making them the first class of his great division of ZOOPHYTES, or animals with prehensile and retractile tentacula, and Lamarck placing them also in a separate class, under the title of RADIARIA.

In this class the radiated structure, both externally and internally, forms a distinctive character. The body is generally orbicular, covered with a skin or a crustaceous or calcareous envelope, and often armed with tubercles or jointed and moveable spines. The interior cavity is provided with distinct viscera, and a kind of vascular system maintains a communication with the different parts of the intestine and with the organs of respiration. These organs consist in pores or orifices, or exterior tubes for the passage of the water. The animals of this class are destitute of head, eyes, and articulated feet; their nervous

system is indistinctly traced ; and their organs of motion are extremely imperfect.

The Echinodermata are all marine animals, and have the faculty, like many other of the more imperfect animals, of speedily regenerating parts of their bodies which have been broken or separated. Lamarck divides the class into three sections, viz. FISTULIDES, ECHINIDES, and STELLERIDES, while Cuvier arranges it in two orders, the first including those which possess numerous membranous tentacula, serving as organs of motion, and the second those which are destitute of these organs. Latreille makes two classes of the same animals, under the names of *Holothurida* and *Echinoderma*. The arrangement of Lamarck is chiefly followed ; but we have added a fourth section, comprising, under the title of CRINOIDÆ, given to them by Mr Miller, the animal remains known by the name of Encrinites, &c.

SECTION I.—FISTULIDES.

Skin soft, mobile, and irritable ; body elongated, cylindrical, soft, and very contractile.

The Fistulides have an elongated cylindrical body, strongly contractile, with the internal organs distinct, and in a common cavity, and respire through the medium of water by pores or retractile tubes. All live in the sea, near the coasts.

Gen. 1. SIPUNCULUS, Lam.

Body elongated, cylindrical, naked, narrowed posteriorly, but with a terminal inflation, and having anteriorly a narrow cylindrical neck ; mouth orbicular, terminating the neck, with a cylindrical proboscis, finely papillated exteriorly and retractile ; anus lateral, placed towards the anterior extremity.

S. nudus, Lam. With the epidermis striated. Inhabits European coasts.—*Lam.* iii. 78.

S. edulis, Lam. Whitish flesh-coloured, cylindrical, subequal ; the posterior extremity subclavate, the anterior dilated, papillose. Inhabits Indian shores.—*Lam.* iii. 79.

Gen. 2. PRIAPULUS, Lam.—*Holothuria*, Lin.

Body elongated, cylindrical, naked, annulated transversely, with the anterior extremity glandiform, almost club-shaped, striated longitudinally, and retractile ; mouth terminal, orbicular, with connate teeth at the orifice ; anus at the posterior extremity, and a papilliform filament near it.

P. caudatus, Lam. Three to six inches long. Inhabits shores of the Northern Ocean.—*Lam.* iii. 77.

Gen. 3. FISTULARIA, Lam.—*Holothuria*, Mull.

Body free, cylindrical, soft ; skin coriaceous, very rough and

tubercular ; mouth terminal, surrounded with dilated tentacula at the summit, the flattened part divided or dentated ; anus at the posterior extremity.

The *Fistulariæ* are in general more tubercular than the *Holothuriæ*, and differ from them besides in the particular form of the tentacula surrounding the mouth.

F. elegans, Lam. With spreading, flattened, and divided tentacula at the apex ; body papillose.—*Lam. iii. 75.*

F. tubulosa, Lam. (*H. tremula*, Soland.) With spreading, flattened, and divided tentacula at the apex ; body slightly elongated, papillose above, and below with retractile tubes.—*Lam. iii. 75.*

F. digitata, Lam. With digitated tentacula at the apex ; body cylindrical ; papillæ small, in the form of points.—*Lin. Trans. xi. pl. 4, fig. 6.*

Gen. 4. HOLOTHURIA, Lam. Mull.

Body free, cylindrical, thick, soft, very contractile ; skin coriaceous, generally papillose ; mouth terminal, surrounded with tentacula divided laterally, branched or pinnated ; five calcareous teeth at the mouth ; anus at the posterior extremity.

The animals of this genus are found on the shores of the sea among the rejectamenta. In some species, besides the papillæ, are found retractile tubes, which are supposed to serve for attaching them to marine bodies ; and in others holes around the mouth for the same purpose. The body of the *Holothuriæ* is perforated at both ends, and the anterior extremity, in the centre of which is the mouth, is flattened. From the posterior opening water is frequently projected. These animals are very contractile, and have the power of withdrawing easily all their exterior organs, such as their tentacula, their mouth, the papillæ and tubes ; and their figure is often so much changed by these contractions as to appear like an unformed mass.

H. frondosa, Lam. Tentacula leafy ; body smooth.—*Lam. iii. 73.*

H. phantapus, Lam. Tentacula branching ; body narrowed posteriorly, and rough below with points.—*Lam. iii. 73.*

H. doliolum, Lam. (*Actinia*, Pall.) With villose bipartite granular tentacula ; body pentagonal, papillose.—*Lam. iii. 74.*

SECTION II.—ECHINIDES.

Crust immoveable and solid ; body subglobular or depressed, without radiating contractile lobes ; anus distinct from the mouth ; spiniferous tubercles immoveable on the shell, but the spines moveable.

In the animals of this section the intestinal canal has two openings. The mouth consists of five double flattened solid columns striated transversely, with a dentated edge towards the centre, and terminated anteriorly in an oblique point. These ten plates, joined in pairs, are strengthened exteriorly at their base, towards the bottom of the mouth, by fifteen narrower pieces, in such a manner that the twenty-five pieces which compose this organ present the appearance of a reversed cone, of which the base is interior, while the apex forms the entrance of the mouth with five oblique points. This apparatus is calculated to break the food introduced into the mouth. The covering is solid and immoveable, covered with tubercles, upon which are articulated moveable spines of various form and size, according to the species. When the animal is dead the spines fall off, and the shell is found pierced with a number of small holes, from which issue in the living animal retractile tubes, which are projected at will. These holes form on the shell porous bands disposed in pairs, which diverge

on all sides like rays, sometimes prolonged to the mouth, and sometimes interrupted before arriving at the margin. The retractile tubes which project from the small holes are conceived some of them to be exercised in respiration, and the others for locomotion, or for fixing the animal by acting as so many suckers; but the spines also contribute, at least in some species, to locomotion. The Echinides were included by Linnaeus in one large genus, *Echinus*, which later naturalists have subdivided into more precise groups. Lamarck divides the family thus:—

1. Anal opening above the margin, and dorsal.

a. Anus dorsal and vertical; shell regular.

Gen. CIDADITES, ECHINUS.

b. Anus dorsal, but approaching the margin.

Gen. NUCLEOLITES, CASSIDULUS.

2. Anal opening under the margin in the inferior disc, or on the margin.

* Mouth inferior, not central, but approaching the margin.

Gen. SPATANGUS, ANANCHYTES.

** Mouth inferior, always central.

Gen. GALERITES, ECHINONEUS, FIBULARIA, CLYPEASTER, SCUTELLA.

Gen. 5. CIDADITES, Lam.—*Echinus*, Pall.

Body regular, spheroidal or depressed-orbicular, very rough; covering solid, testaceous or crustaceous, furnished with tubercles perforated at the summit, upon which are articulated moveable spines; five divisions radiating from the summit to the mouth, each bordered with two multiporous almost parallel bands; mouth inferior, central, armed with five osseous pieces; anus superior and vertical.

The Cidarites are distinguished from the Echini not only by their external aspect, but by having the shell and the large tubercles pierced with holes for a muscular chord which moves the spines. The compartments of the shell are also narrower and more regular, and the spines are of two forms, some large and others very small.

* *Shell gibbous, subspheroidal, with wared compartments.*

C. imperialis, Lam. Shell subglobose, depressed, the compartments and the smaller spines purplish violet; the large spines cylindrical, subventricose; the apex striated and banded with white. Inhabits Mediterranean sea.—*D'Argenv.* pl. 7, fig. A.

C. pistillaris, Lam. Shell subglobose, depressed, the larger spines fusiform, subulate, and rough with sharp points, the neck sulcated, and apex obtuse. Inhabits coasts of Isle of France.—*Lam.* iii. 55.

** *Shell orbicular, depressed, with the compartments straight.*

C. calamaria, Lam. Shell depressed-spheroidal, spinous and setiferous; the spines slender, smooth, fistulose; transversely striated, and banded with white and greenish; fragile setæ between the spines. Inhabits Indian Ocean.—*Lam.* iii. 58.

C. diadema, Lam. Shell hemispheric, depressed, with five compartments, the centre warty; spines long, bristly, subfistulose, scabrous. Inhabits Indian Ocean.—*Lam.* iii. 59.

Gen. 6. ECHINUS, Lam. Lin.

Body regular, gibbous, orbicular, globular or oval; covering solid, testaceous, furnished with imperforate tubercles, up-

on which are articulated moveable and caducous spines ; five compartments, each margined with two multiporous diverging bands, which extend in rays from the summit to the mouth ; mouth inferior, central, armed with five bony enamelled pieces ; anus superior.

The animals of this genus, like the preceding, move by means of their spines and tentacula. The body is covered with a calcareous crust composed of angular portions joined together, and pierced with regular rows of small holes for the passage of the tentacula or membranous feet. The mouth is furnished with five teeth or bony plates set in a calcareous and complicated frame furnished with muscles and suspended in the large opening of the shell. The intestine is very long and attached in a spiral form to the interior walls. A double vascular system runs along this canal ; and five ovaries placed around the anus have each a particular orifice. These form the edible part of the animal. The Echini feed on small shells. Their movements are slow. The interior of the shell is always full of water. Many fossil species of this and the preceding genus are found in the chalk formation, generally filled with silex.

* *Shell orbicular.*

E. esculentus, Lin. Shell hemispherical-globose, with porous bands, obsoletely verrucose ; spines short, violet coloured. 4 inches in diameter. Coasts of Europe, &c. B.—*Penn. Brit. Zool.* iv. pl. 36, fig. 1.

E. granularis, Lam. Shell hemispherical, depressed, granulated and rough ; bands porous, verrucose, and irregular ; base flattish.—*Lam.* iii. 44.

E. lividus, Lam. Shell hemispherical, depressed, the bands porose, flexuous, subverrucose ; spines sharp, long, striated, livid fuscous. Inhabits coasts of the Mediterranean.—*Lam.* iii. 50.

** *Shell oval or elliptical.*

E. atratus, Lin. Shell hemispherical-oval, depressed, blackish violet, spines of the back imbricated, very short and obtuse. Inhabits Indian Ocean.—*Lam.* iii. 51.

E. trigonarius, Lam. Shell hemispherical-oval, with porose and flexuous bands ; tubercles mammillated ; spines long, trigonal, attenuated and obtuse.—*Lam.* iii. 51.

Gen. 7. NUCLEOLITES, Lam.

Body oval or cordiform, slightly irregular, convex ; compartments complete, radiating from the summit to the base ; mouth subcentral ; anus above the margin.

The species of this genus are fossil.

Gen. 8. CASSIDULUS, Lam.

Body irregular, elliptical, oval or subcordiform, convex or gibbous, furnished with small spines ; five stellated compartments ; mouth subcentral ; anus above the margin.

C. Australis, Lam. Obovate, widest behind ; spines small ; subcarinated round the vertex ; anus transverse ovate. Inhabits seas of New Holland.—*Lam.* iii. 35.

The other species of this genus are fossil.

Gen. 9. SPATANGUS, Lam.

Body irregular, oval or cordiform, subgibbous, furnished with very small spines; four or five unequal compartments; mouth unarmed, transverse, labiated, approaching the margin; anus lateral, opposite the mouth.

The *Spatangi* and the *Ananchites* are the only genera of the section which have the mouth lateral; in all the others it is central. They differ from the *Echini* besides in not having a mouth armed with bony teeth. Their body is of an irregular form, often gibbous, and always less deep than broad. The compartments are more or less deeply marked, and to the number of four or five. They live in the sand.

* With four compartments.

S. pectoralis, Lam. Shell oval-elliptic, depressed, large, with four compartments, the interstices elegantly granulated.—*Seba*, *Mus.* iii. pl. 14, fig. 5, 6.

S. ventricosus, Lam. Shell ovate, gibbous; compartments four, oblong, with impressed furrows; larger tubercles placed in a zigzag form. West. Indian seas.—*Lam.* iii. 29.

S. purpureus, Lin. Shell heart-shaped; compartments four, lanceolate, plane, the larger tubercles in a zigzag form. Inhabits European seas. B.—*Pen. Brit. Zool.* iv. pl. 37.

** With five compartments.

S. canaliferus, Lam. Oblong-cordate, base behind gibbous, with five impressed patulous compartments, and the fore part deeply furrowed. Inhabits Indian Ocean.—*Rumph. Mus.* pl. 14, fig. 2.

S. arcuarius, Lam. Shell cordate, inflated, gibbous behind, with five compartments, the lateral ones resembling a double arch; mouth subcentral. Inhabits American and African seas.—*D'Ar-genv.* pl. 25, fig. 1.

Gen. 10. ANANCHYTES, Lam.

Body irregular, oval or conoid, furnished with spiniferous tubercles in the living state; compartments diverging from a simple or double summit, and extending without interruption to the margin or to the mouth; mouth near the margin, labiated, subtransverse; anus lateral, opposed to the mouth

The *Ananchites* much resemble the *Spatangi* in their lower part; but the compartments are radiated and uninterrupted. None of the genus are known in the living state. The species, which are all fossil, are found near Paris and in various parts of France, and many have been figured by Klein.

Gen. 11. GALEBITES, Lam.

Body elevated, conoid or almost oval; compartments complete, formed of ten furrows, which radiate in pairs from the summit to the base; mouth inferior and central; anus in the margin.

The species of this genus are all fossil.

Gen. 12. ECHINONEUS, Lam.

Body ovoid or orbicular, convex, slightly depressed; compart-

ments complete, formed of ten furrows radiating from the summit to the base; mouth subcentral; anus inferior, oblong, near the mouth.

E. semilunaris, Lam. Ovate-oblong, subdepressed, with four pores towards the vertex; mouth oblong, transversely oblique. Inhabits sea at St Domingo.—*Lam.* iii. 19.

Gen. 13. FIBULARIA, Lam.

Body subglobular, ovoid or orbicular, with the margin none or rounded, and the spines very small; five short and narrow bordered compartments; mouth inferior, central; anus near the mouth, or between the mouth and margin.

These animals, the smallest of the Echinides, have generally a subglobular or ovoid form.

F. Tarentina, Lam. Oval-elliptic, slightly convex above, and a little concave below; compartments short, disjoined from the apex; anus near the mouth. Mediterranean sea.—*Lam.* iii. 17.

Gen. 14. CLYPEASTER, Lam.—*Echinus*, Lin.

Body irregular, oval or elliptical, often inflated or gibbous, with the margin thick and rounded, the inferior surface concave in the centre; spines very small; five margined compartments, resembling a flower of five petals; mouth inferior, central; anus near or in the margin.

There are fossil species of this genus.

C. rosaceus, Lam. Oval-elliptic, pentagonal, the back convex; posterior margin obtuse; inferior surface corneous; compartments large. Inhabits Indian and American ocean.—*Lam.* iii. 14.

Gen. 15. SCUTELLA, Lam.

Body flattened, elliptical or suborbicular, slightly convex above, plane below, with the margin thin, almost edged, and furnished with very small spines; compartments bordered, short, like a flower of five petals; mouth inferior, central; anus between the mouth and margin, rarely in the margin.

These are, of all the Echinides, those which have the shell the most flattened, and the smallest spines, and may be considered in some measure as forming the passage to the *Asteriæ*.

S. dentata, Lam. Orbicular, depressed, the disc entire; posterior margin serrated. Inhabits Indian seas.—*Klein*, pl. 49, fig. 6, 7.

S. sexforis, Lam. Orbicular, depressed, obsoletely truncated, with six oblong pores; anus near the mouth. Inhabits Indian and American ocean.—*Klein*, pl. 50, fig. 3, 4.

There are some fossil species of this genus.

SECTION III.—STELLERIDES.

Skin coriaceous, not irritable, but moveable in certain points; body short, depressed, broader than long, with angles or mar-

ginal lobes, more or less numerous, radiating, and moveable ; no anus.

The Stellerides, including the genus *Asterias* of Linnaeus, are so named from their body being radiated or divided into arms around a common centre, with the mouth below, which serves also as the anus. The skeleton of the body is composed of small osseous pieces variously combined ; and the reproductive power is such, that not only is one ray or arm when taken away speedily reproduced, but even a single ray is sometimes found to originate others, and to form a complete animal. In the genus *Asterias* each arm has a longitudinal furrow below, full of small holes, through which the feet or filamentous processes are extruded. The rest of the under surface is furnished with small moveable spines. All the surface is also supplied with tubes much smaller than the feet, which appear to absorb the water and pass it into the general cavity for the purpose of respiration. In the middle of the body, a little to one side, is a small stony plate, of which the use is not known. In the interior, and immediately over the mouth, is a large stomach, from which originate two cæcums for each ray, ramified like a tree, and suspended each in a kind of mesentery. There are also two ovaries in each ray ; and it appears that the *Asterias* are hermaphrodite. The bony skeleton consists principally for each division of a sort of column composed of stony circles, from which arise cartilaginous branches which support the exterior envelope. Other bony parts, to which are often attached moveable spines, accompany the lateral margins of the arms. Lamarck divides the Stellerides into four genera.

Gen. 16. ASTERIAS, Lam. Lin.

Body suborbicular, depressed, divided in its circumference into angles, lobes, or rays, disposed in a stellated form ; under surface of the rays furnished with a longitudinal furrow, bordered on each side with moveable spines, and holes for the tubular or retractile feet ; mouth inferior and central, at the union of the furrows.

This genus of animals is popularly known by the name of Sea-stars. They are very common on most coasts. The upper surface is generally coloured. It is red in some, violet or blue in others, orange, yellow, reddish, or a mixture of these. The inferior surface is commonly whitish yellow. Their skin is coriaceous, more or less granular or tubercular, and moveable in all directions. The inferior surface, as above remarked, presents as many longitudinal furrows as there are arms or rays. These rays, diverging from the mouth, which is their centre of union, end at the extremity of the arms. Along the margins of the furrows are many rows of short, slender, and moveable spines, which are often so numerous that Reaumur counted upwards of fifteen hundred in a ray. Besides these spines, the *Asterias* are provided with very numerous small holes along the margin of the furrow, or perforations for the passage of retractile tubes, which serve to fix the animal to marine bodies, or for locomotion ; and still smaller tubes on the dorsal surface, for the purpose of respiration. The mouth, situate below and in the centre, is armed with five bony processes, which meet and shut the centre of the opening. This aperture serves also as the anus. The *Asterias* feed on marine worms, crustacea, and small shell-fish. Lamarck divides the genus into 1. Those in which the angles, lobes, or rays, do not exceed in length the diameter of the disc. 2. Those in which the rays are elongated, and much exceed the diameter of the disc.

* *Rays shorter than the central disc.*

A. tessellata, Lam. Body flattened, pentagonal, tessellated, subgranular ; margin articulated. Inhabits seas of Europe, America, and India.—*Lam. ii. 552.*

A. reticulata, Lin. Five lobed, large, thick ; back reticulated, rough with short spines, irregularly inflated in the centre ; lobes conical and spinous, or dentated. 10 to 12 inches broad. Inhabits Indian seas.—*Lam. ii. 557.*

A. nodosa, Lin. With five carinated and spinous rays ; margin unarmed. Inhabits Indian seas.—*Lam. ii. 557.*

A. papposa, Lin. Back and margin muricated with pappose pencils, reddish or ferruginous, with twelve to fifteen lanceolate rays. Inhabits European and Asiatic seas.—*Lam. ii. 559.*

A. endeca, Lin. Rough, with very small spines, and from six to nine tortuous rays. Inhabits Northern seas.—*Lam. ii. 560.*

*** Rays much longer than the diameter of the central disc.*

A. glacialis, Lam. With five long, tortuous, angular-ribbed rays ; ribs warty and spinous ; three dorsal ribs. Sometimes $1\frac{1}{2}$ foot in diameter. Inhabits Northern ocean.—*Lam. ii. 561.*

A. rubens, Lam. With five lanceolate papillous and spinous rays ; papillæ of the back scattered, and nearly in rows. Common in the seas of Europe.—*Lam. ii. 562.*

A. aranciata, Lin. Disc wide, with five depressed lanceolate rays ; back rough with short spines ; margin articulated and ciliated with spines. Inhabits seas of Europe.—*Lam. ii. 563.*

Gen. 17. OPHIURA, Lam.

Body orbicular, depressed, with the back naked, and a row of slender, elongated, cirrous, simple, papillous or spinous rays upon the sides, almost pinnated ; lower surface of the rays flattened, and destitute of furrow or canal ; mouth inferior and central ; pores in the vicinity of the mouth.

The Ophiuræ have in general a very small body, and the rays are very long, cirrous, scaly, and articulated. These rays are furnished on both sides with short papillæ, or spines disposed in transverse rows, but the spines are only articulated at their base. The rays which have spines appear as if pectinated. The animal uses the rays as a species of legs for the purpose of locomotion. The stomach has no cæcums.

** Rays rounded or convex on the back.*

O. lacertosa, Lam. Rays elongated, smooth and subulate ; lateral papilla very short, often adpressed in a transverse series. Inhabits seas of Europe. The rays resemble the tail of a lizard.—*Lam. ii. 542.*

*** Rays flattened on the back.*

O. squamata, Lam. Disc orbicular and smooth ; back of the rays with broad imbricated scales ; spines of the margin short. Inhabits European and Atlantic seas.—*Lam. ii. 545.*

O. fragilis, Mull. Back of the disc rough with spines, and ten linear and subulate rays, spinous and pectinated at the margin. Inhabits Northern ocean.—*Lam. ii. 546.*

Gen. 18. EURYALE, Lam.—*Asterias*, Lin.

Body orbicular, depressed, with the back naked, divided in its circumference into a row of slender elongated dichotomous rays, which are subdivided and cirrous ; rays flattened below, and cylindrical on the back ; mouth inferior and central ; ten elongated openings under the disc, and towards its margin.

The rays in this genus, which arise from a very small disc, are generally five in number at their origin, but they bifurcate in certain species, and branch out to a great number. They are never pectinated or pinnated by the rows of spines as in the *Ophiuræ*.

E. verrucosum, Lam. Disc broad, radiated above, with verrucose ribs; ribs flat below, with two rows of papillæ; papillæ small, submarginal. A large species. Indian seas.—*Lam.* ii. 537.

E. costosum, Lam. Back of the disc with ten smooth rays arranged in pairs; apex truncated; rays dichotomous, branching, transversely rugose. American seas.—*Shaw, Zool. Mis.* iii. pl. 103.

Gen. 19. COMATULA, Lam.

Body orbicular, depressed, radiated; rays of two kinds, dorsal and marginal, all furnished with calcareous articulations; dorsal rays very simple, filiform, cirrous, small, ranged on the back of the disc; marginal rays always pinnated, much larger than the simple rays, the inferior pinnulæ elongated, bending downwards, and surrounding the ventral disc; mouth inferior, central, isolated, membranous, tubular, and projecting.

The number of proper or pinnated rays in this genus is usually five; but in certain species these rays are divided almost to their base into two, three, four, and sometimes five branches, supported on a short peduncle. These rays, however, are distinct from those of the genus *Euryale*, in not being dichotomous.

C. solaris, Lam. With ten wide pinnated rays, the back flattened, sulcated below with transverse crenated ribs. About a foot in diameter. Inhabits South seas.—*Lam.* ii. 533.

C. fimbriata, Lam. (*Stella Chinensis*, Petiv.) With pinnated rays divided into from two to five portions at the base; rays slender; joints of the margin subciliated. Inhabits Southern seas.—*Petiv. Gaz.* pl. 4, fig. 6.

SECTION IV.—CRINOIDEÆ.

The remains of the animals of this family, till lately only found in a fossil state, were known under various names, as *Entrochi*, *Trochites*, and *Enerinites*. Their fragments, of various forms, and disseminated in great quantities through calcareous rocks, proves the former existence of the animals in great numbers in the ancient ocean; and the discovery of a recent species leads to the hope that other individuals of the same or connected genera may await the research of future naturalists. The genus *Enerinus*, as formerly characterized, embraced animals with an osseous or stony stalk, ramified or umbellate at the summit, and articulated throughout, covered by a membrane, and furnished with polypiferous tubes. Cuvier arranged the *Enerinites* among the *Echinodermata*, and Lamarck placed them among the *Polypi*. Mr Miller, in his excellent work on the *Crinoidea*, or *Lily-shaped Animals*, arranges these remains in four sections.

- I. Plates of the body or pelvis resting on the last columnar joint, and forming the cup containing the viscera, articulated with each other by lip-like and transverse processes, having a minute perforation. Gen. *Apiocrinites*, *Pentacrinus*.
- II. Plates of the body articulating imperfectly with each other by transverse processes, having a minute central perforation. *Poteriocrinites*.
- III. Plates of the body adhering by sutures lined by muscular ligament. *Cyathocrinites*, *Actinocrinites*, *Rhodocrinites*, *Platycrinites*.
- IV. Plates of the body anchylosing with the last columnar joint.

Gen. PENTACRINUS, Thompson.

Pelvis of five plates, supporting five costals ; column not enlarging at the summit ; fingers formed of a single series of joints ; column pentagonal, the articulating surfaces of the columnar joints petal-shaped.

P. *Europæus*, Thomp. Arms ten, nearly simple ; axillary side arms five, at the summit of the body. Found in the Cove of Cork, Ireland.—*Fleming, Brit. Anim.* 493.

Numerous remains of extinct animals of this family occur in the limestones of Britain.

CLASS XI.—ENTOZOA, Rud.—*Vermes*, Lam.

Body soft, elongated, naked in almost all, without head, eyes, or feet ; mouth formed of one or many suckers ; no tentacula or organs of respiration ; intestinal canal in some scarcely perceptible.

THE intestinal worms are remarkable for existing and propagating only in the interior of other animals. There is scarcely an animal in which there are not found some species of parasitical worm ; and they occur not only in the alimentary canal and the vessels which communicate with it, such as the hepatic vessels, but even in the cellular tissue, in the liver, and the brain. The difficulty of conceiving how they appear in these parts, joined to the observation, that they are never found but in living bodies, had led some naturalists to suppose that they were engendered spontaneously. It is, however, now ascertained, not only that the greater part produce ova or living young, but that many have separate sexes, and couple as ordinary animals. These germs or ova, however, must be of extreme minuteness to be able to pass through channels so narrow.

The intestinal worms being destitute of trachea, branchiæ, or any other organ of respiration, must necessarily acquire oxygen through the medium of the animals which they inhabit. No traces of circulating vessels have been detected ; and the vestiges of nerves are so obscure, that many naturalists have doubted their existence. When these characters are found in an animal

similar in form to those of this class, it is arranged along with this division, though it does not inhabit the interior of another species.

Linnaeus arranged this group of animals in a division of his great class *Vermes*, including the genera *Lumbricus*, *Sipunculus*, *Fasciola*, *Gordius*, *Ascaris*, *Hirudo*, and *Myxine*. Subsequent writers, such as Pallas, Muller, Blumenbach, Bloch, and Goeze, established new genera or added new species; and more lately, Cuvier, Lamarck, Rudolphi, and Bremser, from more detailed examination of the animals, and a more intimate knowledge of their structure, have proposed arrangements better suited to the present state of the science. M. Lamarck divides the class into three orders, viz. *HISPIDÆ*, *RIGIDULÆ*, and *MOLLASSÆ*, the last of which is subdivided into three sections. In the method of Cuvier the class forms two orders, *LES CAVITAIRES*, and *LES PARENCHYMEUX*, according to the structure of their body. And Rudolphi, in his work entitled *Entozorum sive Vermium Intestinorum Historia Naturalis*, arranges them into five orders, viz. 1. *NEMATOIDES*: Body elongated, cylindrical, elastic. 2. *ACANTHOCEPHALUS*: Body cylindrical, slightly elastic, with an anterior simple or compound prolongation covered with a series of bent and retractile spines. 3. *TREMATODES*: Body flattened or slightly cylindrical, soft, and provided with pores for suction. 4. *CESTOIDEA*: Body elongated, flattened, soft, of one or many pieces. 5. *CISTICORUS*: Body terminated by or adhering to a vesicle. This arrangement includes besides three isolated genera, which would not admit of being placed under the previous heads. Latreille, in his *Familles du Règne Animal*, disposes the intestinal worms chiefly after the methods of Rudolphi and Cuvier; combining in his sketch of the class the general views of these excellent naturalists. As the method of Latreille is here followed with one exception, it is not necessary to repeat the characters of the subdivisions. That branch of natural science which treats of Intestinal Worms is generally termed *Helminthology*.

ORDER I.—ELMINTHOGAMA.—*Vers Cavitaires*, Cuv.

Worms generally living on the exterior of aquatic animals, or in the interior parts of others, with a mouth and anus, and the sexual organs separate; two nervous filaments in some arising near the opening of the œsophagus.

FAMILY I.—ENTOMOIDA.—*Epizoaires*, Lam.

Worms living on the exterior parts of aquatic animals, with appendages resembling feet or organs for locomotion, and the body in the females terminated posteriorly by two ovaries.

This family, comprehending the genus *Lernæa* of Linnæus, consists of parasitical worms attached to the head and other parts of fishes. From their external situation they possess not only organs for piercing and sucking animal substances, but also parts variously constructed for attaching themselves to the surface of bodies; and their body is necessarily of a firmer consistence than those worms which are entirely concealed in the substance of other animals. The general structure and habits of the family are still but imperfectly known. A new species, named *Lernæa elongata* by Professor Grant, is minutely described by that gentleman in the *Edinburgh Journal of Science*, vii. 147; and the anatomical details there given may be considered as applicable generally to the structure of other individuals of the genus.

TRIBE I.—THORACICA.

Body divided into two parts, the one representing the head and thorax united, the other the abdomen.

Gen. LERNANTROPUS, LERNEOPODA, Blainv.; which compose the genus *Chondracanthus* of Cuvier.

TRIBE II.—CAPITATA.

Anterior extremity of the body seeming to have a distinct head.

Gen. LERNACANTHUS, LERNENTOMA, (*Entomoda*, Lam.)

TRIBE III.—ANGUILLIFORMIA.

Body long, linear, with appendages in the form of fins at the posterior extremity; anterior extremity with some small tentacula.

Gen. LERNEOPENNA, Blainv.

TRIBE IV.—RHIZODA.

Body slender and elongated, with appendages only at the anterior extremity.

Gen. LERNEOCERUS, LERNEOMISUS, LERNÆA.

TRIBE V.—ACOLA.

No exterior appendages, the ovaries at most projecting.

I. Ovaries exterior, at the posterior extremity of the body.

Gen. POROCULUM.

II. Ovaries not projecting.

Gen. NEMERTES, PLANARIÆ.

Gen. PLANARIE, Bosc.

Body oblong, flattened, semigelatinous, very contractile, generally simple, sometimes furnished anteriorly with two auricular appendages; two openings under the belly.

The genus *Planaria* of authors has received much elucidation from the experiments and observations made by John Graham Dalyell, Esq. on the living animals, the results of which were published in 1814, under the title of *Observations on Planaria*. In this interesting volume, Mr Dalyell states his investigations as leading him to characterize these animals as forming two divisions, the first of which may be defined, "Naked, flattish, in a state of abstinence, provided with a proboscis protruded from the middle of the belly or under surface; swimming supine." The second division is thus defined: "Body in a state of repletion resembling a double cone, mouth in the anterior extremity." The work is illustrated by coloured plates.

FAMILY II.—LOMBRICOIDA.

Worms living in the interior of the bodies of other animals, and destitute of appendages representing antennæ or feet.

TRIBE I.—ANODONTA.—*Nematoides*, Rudolphi.

Body generally filiform, with the mouth often orbicular, always deprived of hooks or spines, but with lips, papillæ, or a small naked tube in the form of a proboscis.

I. Posterior extremity of the body not terminating in a bag or bladder.

1. Mouth not tubular.

A. Mouth not covered by a striated hood.

Gen. FILARIA, GORDIUS, TRICHOSOMA, TRICHOCEPHALUS, OXYURUS, OPHIOSTOMA, (*Fissula*, Lam. ;) ASCARIS, SPIROPTERA.

a. Body furnished with lateral hairs.

Gen. TUBIFEX, STYLARIA, NAIS.

B. Mouth covered by a striated hood.

Gen. CUCULLANUS.

2. Mouth in the form of an exsertile tube.

Gen. LIORYNCHUS.

II. Posterior extremity of the body in the males in the form of a bag or bladder.

Gen. PHYSALOPTERA, STRONGYLUS.

The species of the genus *Filaria* have a slender elongated body in the form of a thread, with a round mouth at the anterior extremity. They are found chiefly in the interior of animals, in the cellular substance, in the muscles, and in the parenchyma of the viscera. The most celebrated species is the *F. Medicensis* of Gmelin, very common in warm countries, which insinuates itself under the human skin, principally of the legs, and often occasions serious injury. It is sometimes found ten feet in length. It is extracted by slow degrees for fear of breaking in the wound; and the negroes are very dexterous in thus withdrawing it. The distinctive character is to have the end of the tail pointed or bent. A species of the genus *Gordius*, (*G. aquaticus* of Linnaeus,) frequently found in Britain in still waters, not thicker than horse-hair, is popularly considered in many parts of the country to be a hair of that description in the act of being transformed into an eel. Cuvier, it may be remarked, places the genera *Gordius*, *Tubifex*, *Stylaria*, and *Nais* of Lamarck in the class of Annelides, while the latter author thinks their proper place is among the worms. The limits of the two classes indeed are not well determined, and can only be ascertained by minute anatomical investigation. The genus *Ascaris* is found in the interior of many animals; and one species, the *A. lumbricoides* of Lin., is found without any sensible difference in man, the horse, the ass, the ox, and swine. It is sometimes found fifteen inches long; and when multiplied to excess in the visceral cavities, often occasions serious disease.

TRIBE II.—ECHINOSTOMA, Lat.

Mouth armed with teeth or hooks, and the body rarely filiform.

Gen. SCLEROSTOMA, (first division of the genus *Strongylus* of Rudolphi;)

SAGITTULA, POROCEPHALUS, ECHINORHYNCHUS, HÆRUCUS, PRIONODERMA, (*Pentastoma*, *Linguatula*, and *Tetragulus*, Rudolphi.)

ORDER II.—ELMINTHAPROCTA. (*Worms without anus.*)

Worms inhabiting the interior of the bodies of different animals; sexual organs united in each individual; no floating alimentary sac, but a simple cavity in the interior; and almost or totally destitute of nerves.

FAMILY I.—HIRUDIFORMIA.

Sexual organs distinct; body not inclosed in a cyst, nor terminated posteriorly by a bag, soft, depressed, more or less resembling that of a leech, with suckers, of which one or more serve as the mouth.

The animals of this family are extremely numerous, and have the faculty of attaching themselves by suction to the internal parts of other animals. They have in general an oblong body, with two suckers, of which one is at the anterior extremity, and the other on the side or under the belly. The *Fasciola hepatica* Lin., one of the most common, is found in the liver of domestic animals, and chiefly of the sheep. While in small number they may be borne without much injury; but when they exist in great quantity, and fill the biliary canals, they produce serious disease.

TRIBE I.—OLIGOPORA.

With one or two suckers.

Gen. FASCIOLA, STRIGÆUS (*Amphistoma*); FESTUCARIA, (*Monostoma*); GEROPHLEUS.

To this tribe belong the genera *Hypostoma*, *Alaria*, and *Lobostoma*, of Bremser.

TRIBE II.—POLYPORA.

With at least three suckers.

Gen. TRISTOMA, POLYSTOMA.

FAMILY II. CESTOIDEA, Rudolphi.

With sexual organs, or at least distinct ovaries; body long, and often articulated, not inclosed in a cyst; mouth either consisting of four trunks, or osculi surrounding a proboscidiform mamilla or pore, with small spines in some and simple hooks in others.

The animals of this family are all intestinal, and one genus, *Tænia*, has long been known as infesting the human body. The tape-worms have an elongated body, often to an excessive degree, flattened, more or less marked by articulations, narrowed anteriorly, and having a square head with four small suckers. The *Tænia lata* of Rudolphi has the joints broad and short and a double pore in the middle of each lateral face. It is commonly about twenty feet long, and has been found to exceed a hundred. It is very tenacious of life, and it requires the strongest medicines for its expulsion. The ancient physicians believed that if any of the joints of the *Tænia* were

broken off or displaced in the body that this segment became a complete worm. It is now, however, ascertained that when this is the case, the portions are expelled; but that, if a living head be attached to one or more segments, the animal grows to its usual size by the addition of new joints. It is worthy of remark, that the stomach and intestines of no animal seems to have the power of digesting the *Tania* or its fragments, either living or dead; although their substance appears to be of a nature which would readily be dissolved by the gastric apparatus. The domestic animals are equally subject to attacks of different species of *Tania*. Chabert found two hundred and twenty-seven in a dog; a hundred and eighty-one in a horse; and twelve in a sheep.

TRIBE I.—ANTHOSTOMA.

With four trunks or projecting and retractile suckers.

I. Trunk spinous.

Gen. *TETRARHYNCUS* (*Tentacularia*, Lam.); *RIHYNCHOBOTHRIS* (*Botriocephali proboscidei*, Rud.)

II. Suckers or trunks naked or without spines.

Gen. *TETRABOTHRIS*, (*Botriocephali tetrabothrii*, Rud.); *GYMNORHYNCUS*, Rudolphi.

TRIBE II.—STEPHANOSTOMA.

With but one trunk, and the lateral suckers slightly or not at all projecting.

I. Four osculi or suckers.

Gen. *SCOLEX*, *TÆNIA*.

II. Two osculi, or two three-pointed spines.

Gen. *BOTRIOCEPHALUS*, (*B. dibothrii*, Rudolph.); *TRICUSPIDARIA*, (*Tricnophorus*, Rud.) *LIGULA*.

FAMILY III.—CYSTICA, Rudolphi.

Animals inclosed in a cyst, sometimes solitary, sometimes in society, and even in many groups; body either almost entirely or posteriorly vesicular; no ovaries.

The worms of this family, generally known by the name of *Hydatids*, are often found in the bodies of other animals; and till the investigations of Rudolphi and others their nature was but imperfectly understood, as being organized animals or tumours arising from disease. Some species multiply to a great extent in quadrupeds, particularly the *Ruminantia*; and one species is well known as particularly infesting swine, penetrating even the heart and eyes.

TRIBE I.—MONOBIA

Cyst inclosing but one animal.

Gen. *FLORICEPS*, (*Anthocephalus*, Rudolphi); *CYSTICERCUS*, (*Hydatis*, *Hydatigera*, Lam.)

TRIBE II. SYNBLA.

Cyst inclosing many animals and often groups, and which they are capable of leaving or entering.

Gen. *CÆNURUS*, *ECHINOCOCCUS*.

The *Cænurus cerebralis*, (*Tania cerebralis*, Gmel.) which is developed in the brains of sheep, is known as the cause of a kind of paralysis which makes them turn round involuntarily. It has been found also in oxen and other ruminating animals, where it produces the same effects. The sac is sometimes as large as an egg. The worms are about half a line long.

CLASS XII.—ACALEPHA.

Body gelatinous, circular and radiated, with the skin soft and transparent, susceptible of contraction and dilatation.

THE class Acalepha of Cuvier embraces the *Radiaires* *Médusaires* and *Anomales* of Lamarck, and besides includes the genus *Actinia*, which the latter author had placed in a division of his *Echinodermata*.

The animals of this class are either fixed by a base, or float freely in the ocean, and many are suspended in the water by the specific lightness of some of their parts, or by the air contained in their bodies. Their substance is gelatinous, without apparent fibres, though susceptible of contraction and dilatation. The sort of vessels found in some are merely canals in the gelatinous substance, connected with the stomach; none of their movements seem connected with muscular action; there is no proper cavity for containing organs; the mouth or the suckers or tentacula in the centre of the inferior surface is unprovided with hard parts; and the stomach, or the organ of digestion and nutrition, is a simple sac without outlet. Between this sac and the external skin is a complicated but obscure organization. The Acalepha shine during the night with a phosphoric luminosity. Many species are ornamented with lively colours. They are common in all seas. Cuvier divides the class into two Orders, viz. 1. Those where the body is fixed by a base, either permanently or occasionally; and 2. Those which float freely in the ocean.

SECTION I.—Body fixed.

This division comprehends those soft animals which fix themselves by their base. Though thus fixed, however, they have the power of crawling upon this base, or detaching it altogether, and of swimming or allowing themselves to be carried by the water; but the motion is generally limited to the expansion of the opening of their mouth, which serves also for an anus. This mouth is surrounded by tentacula, more or less numerous, and opens into a stomach without other outlet. Between this interior sac and the exterior skin is a complicated but obscure organization, consisting of vertical and fibrous leaflets, to which the ovaries adhere, similar to twisted threads.

Gen. 1. ACTINIA, Lam.

Body cylindrical, fleshy, simple, very contractile, fixed by its base, but having the faculty of displacing itself; mouth termi-

nal, margined with one or many rows of radiated tentacula, disappearing in contraction, and resembling a flower in blossom.

The Actiniæ, which Linnæus placed among the Mollusca, are fixed by their flattened base to marine bodies nearly on a level with the water; but they possess the faculty of displacing themselves and changing their situation. Their body is oblong, cylindrical, fleshy, and contractile, elongated in the form of a syphon or tube, and shortening in contraction, so as to form in appearance a globular or oval bulb. The superior extremity of the body is flattened and orbicular, and in the centre is the mouth of the animal, with the tentacula placed around in one or many rows. When displayed these tentacula have the appearance of a flower in blossom, and hence the animal has been popularly termed the *Sea Anemone*. The circular disc formed by the tentacula has so much the more resemblance to the petals of a flower, that they are in general of brilliant colours. The Actiniæ feed on the smaller marine animals, which they seize with their tentacula, keep in their stomach for ten or twelve hours, and reject the undigested parts by the mouth. They are multiplied by internal gemmæ or ova thrown out by the mouth. Some species of Actiniæ are eaten in the Levant and Italy. Lamarck places the Actiniæ among the Echinodermata; but we have followed Cuvier in placing the genus in this class.

A. rufa, Lam. (*A. equina*, Lin.) Body semioval, smooth; cirri pale-coloured. Inhabits European seas.—*Lam.* iii. 67.

A. crassicornis, Lam. (*A. felina*, Lin.) Body substiated; cirri thick, conico-elongate. Inhabits European seas.—*Lam.* iii. 68.

A. plumosa, Lam. Tentacula small; margin of the disc with circled tufts. Inhabits European seas.—*Lam.* iii. 68.

A. senilis, Lam. Body subcylindrical, transversely rugose. Inhabits seas of Europe.—*Lam.* iii. 68.

A. pedunculata, Pen. Body cylindrical, red, verrucose; tentacula short, variegated. Inhabits coasts of England.—*Lam.* iii. 70.

A. verrucosa, Lam. Body cylindrical, red, glandular; mouth appendiculated, with projecting tentacula. Inhabits coasts of England.—*Lam.* iii. 70.

Gen. 2. ZOANTHUS, Cuv.—*Hydra*, Gmel.

Body fleshy, widened at its upper extremity, with the mouth terminal and surrounded by numerous tentacula, as in the preceding genus; but the animals are united in number more or less considerable as a common base, in some forming a stem, in others a broad surface.

Lamarck places this genus among the Polypi.

Z. Ellisii, Bosc. (*Actinia sociata*, Ellis.) Body tubular, pendulous.—*Lam.* ii. 65.

Gen 3. LUCERNARIA, Muller.

Body fixed by a slender pedicle, the upper part dilated like a parasol, with the mouth central, and numerous tentacula in bundles around its margin; eight organs between the mouth and margin, supposed to be ovaries.

L. quadricornis, Muller. Body subcampanulate, the margin divided into four forked branches, each bearing clusters of tentacula. Inhabits the Northern ocean, attached to fuci, &c.

SECTION II.—Body free.

The greater portion of the animals of this section, forming an order in Cuvier's arrangement, were included by Linnæus in his genus *Medusa*. Their general figure is a disc, more or less convex above, similar to the head of a mushroom, with the mouth below, more or less prolonged into a pedicle, and furnished with tentacula of various forms.

Gen. 4. PHORCYNIA, Lam.

Body transparent, orbicular, convex, appearing as if obtuse or truncated above, concave below, with the margin broad, obtuse, naked, and entire; no peduncle, arms, nor tentacula.

The genus *Eulimna* of Peron is included by Lamarck in the present.

P. cudonoidea, Peron. Body thick, widest above, obtuse, rounded; stomach prominent, inversely pyramidal.—*Lam. ii.* 494.

Gen. 5. ÆQUOREA, Peron.—*Medusa*, Gmel.

Body free, orbicular, transparent, destitute of peduncle or arms, but furnished with tentacula; mouth inferior and central.

Æ. rosea, Lam. Body orbicular, rose-coloured, with vascular vessels above; tentacula capillary, long, and numerous.—*Lam. ii.* 497.

The species of this genus are very numerous in the seas of warm countries. Lamarck includes in it the genus *Fovcola* of Peron, distinguished by small hollows at the circumference.

Gen. 6. PELAGIA, Cuv.—*Dianeæ*, Lam.

Body orbicular, transparent, the mouth prolonged into a peduncle, with or without arms.

P. panopyra, Cuv. Body rose-coloured, hemispherical, centre of the back depressed, verrucose; peduncle quadrifid, with eight long tentacula. Inhabits Atlantic Ocean.—*Lam. ii.* 509.

In the preceding genera there are no lateral cavities; but in the following there are, besides a simple mouth, four organs formed of a plicated membrane, filled at certain periods with an opaque substance, which Cuvier suspects to be ovaries. These are generally placed in open cavities on the under surface; and the supposition of Baster and Muller that they were mouths, induced Peron to divide the animals into *Monostoma* and *Polyostoma*. The tentacula at the circumference or mouth vary not only according to the species but with age.

Gen. 7. CYANÆA, Cuv.—*Medusa*, Lin.

Body orbicular, transparent, with the mouth central below, and four lateral cavities; tentacula around the circumference.

Cuvier includes the genera *Obelia* and *Callirhoe* of Peron in this genus.

C. aurita, Cuv. Circumference ciliated, and acquiring with age four long arms; reddish vessels from the stomach to the circumference. Inhabits European seas.—*Cuv. Reg. An. iv.* 56.

Gen. 8. RHIZOSTOMA, Cuv.

Body orbicular, transparent, with a peduncle more or less ramified below; no tentacula at the circumference; four cavities on the inferior disc.

The animals of this genus have no apparent mouth in the centre, and appear to be nourished by the suction of the ramifications of their pedicle, by filaments dis-

posed on their lower surface, or by simple pores. The genus *Cephea* of Peron is only distinguished from the present by having filaments mixed with the dentations of the pedicle.

R. cyanea, Cuv. Of a bluish or purplish colour, and sometimes two feet in breadth; pedicle divided into eight dichotomous and dentated arms, each furnished at their base with two dentated auricles; circumference with a fine net-work of vessels around.—*Cuv. Reg. An.* iv. 57.

Gen. 9. CASSIOPEA, Cuv.—*Medusa*, Pallas.

Body orbicular, transparent, furnished with arms below; peduncle short, with eight arms, and sometimes smaller ones; destitute of tentacula at the circumference; eight cavities below.

C. frondosa, Cuv. Body orbicular, flattened; margin ten-lobed; ten branched arms. Inhabits West Indian seas.—*Lam.* ii. 512.

Gen. 10. GERYONIA, Cuv.—*Medusa*, Forsk.

Body hemispherical, with a peduncle furnished on each side with filaments, which appear to serve as suckers, or with a membrane like a funnel at the end of the peduncle.

This genus includes the genera *Limnorca*, *Geryonia*, and *Favonia* of Peron.

G. proboscidalis, Cuv. Hemispherical; margin with six long tentacula; peduncle long, in the form of a proboscis, with the extremity of the margin plicated. Mediterranean sea.—*Lam.* ii. 505.

Gen. 11. ORYTHIA, Peron.—*Medusa*, Bast.

Body orbicular, transparent; peduncle long, but destitute of the terminal membrane.

O. minima, Peron. Body depressed, discoidal, with eight spots; peduncle naked. Inhabits European coasts.—*Lam.* ii. 503.

Gen. 12. BERENIX, Peron.

Body orbicular, without peduncle, but the under part of the body furnished with small suckers.

B. carisochroma, Cuv.—*Voyage aux Terres Aust.* pl. 30, fig. 2.

Gen. 13. EUDORA, Peron.

Body free, orbicular, discoid, without arms, peduncle, or tentacula; mouth inferior and central.

E. undulosa, Peron. Body orbicular, flattened, discoidal, naked, radiated above by simple vessels, undulated, with diverging polychotomous vessels below.—*Lam.* ii. 493.

Gen. 14. CARYBDEA, Peron.

Body orbicular, convex or conoid above, concave below, without arms, peduncle, or tentacula, but with lobes at the margin.

C. marsupialis, Peron. Body conoidal, margin lobed, with four distant lines. Inhabits Mediterranean sea.—*Lam.* ii. 496.

Gen. 15. BEROE, Mull.

Body oval or globular, with projecting ciliated ribs, in which are vascular ramifications; mouth at one extremity, conducting into a stomach which occupies the axis of the body.

B. ovalus, Fleming. Body orbicular, slightly depressed at the summit, and a little protuberant at the base, with eight denticulated vertical bands or ribs.—*Brit. Animals*, 502.

The genus *Callianira* of Peron differs not from the preceding but in the ribs being more projecting, and joining two and two or three and three to form two kind of wings.

Gen. 16. CESTUM, Lesueur.

Body free, gelatinous, transparent, much elongated, horizontal, flattened on the sides, with one of the margins furnished with a double row of ciliæ; mouth in the centre of this border opening into a transverse stomach without anus.

C. Veneris, Lesueur. About five feet long, and one inch high. Inhabits Mediterranean sea.—*Lam. ii.* 465.

This singular animal is in the form of a long gelatinous ribbon, of a milk white colour, with violet reflections.

Gen. 17. DIPHYES, Cuv.

Body firm, but gelatinous and transparent, in the form of an angular pyramid, with two openings at the base, one of which surrounded by five points is the mouth, the other larger, supposed to be the ovary. One species only has been observed in the Atlantic ocean.

Gen. 18. PORPITA, Lam.—*Medusa*, Lin.

Body free, orbicular, depressed, gelatinous exteriorly, cartilaginous anteriorly, either naked or with tentacula at the circumference; upper surface flat, subtubercular, and the inferior surface with striæ or rays; mouth inferior and central.

P. nuda, Lam. Body orbicular, flat, sub-naked. Inhabits Indian ocean.—*Lam. ii.* 484.

These animals float on the surface of the sea, and M. Bosc, who has observed them in this state, states them as resembling a piece of money supported on the water.

Gen. 19. VELELLA, Lam.—*Medusa*, Lin.

Body free, gelatinous exteriorly, cartilaginous in the interior, elliptical, flattened below, with an elevated crest on the back inserted obliquely; mouth inferior, central, projecting, and surrounded with immoveable tentacula, of which the exterior are largest.

V. limbosa, Lam. Body oval, obliquely crested; inferior surface covered with white suckers, and bordered with long blue tentacula, the mouth forming a subtubular projection in the centre. Inhabits the Mediterranean sea.—*Lam. ii.* 482.

Gen. 20. PHYSALIA, Lam.—*Holothuria*, Lin.

Body free, gelatinous, membranous, irregular, oval, slightly compressed on the sides, vesicular interiorly, with a crest on the back, and tentacula under the belly; tentacula numerous, unequal, of various kinds; some filiform and very long, others short and thick; mouth inferior, subcentral.

The animals of this and the following genera are distinguished by one or many vessels generally filled with air, by means of which they are suspended in the water. These appendages are numerous and varied in their forms, and some Cuvier conceives may serve for suckers, others may be ovaries, and some, longer than the others, may be tentacula. Their mouth is not perceptible.

P. pelagica, Lam. Oval, subtrigonal, with the dorsal crest prominent, and reddish. Inhabits Atlantic ocean.—*Lam.* ii. 480.

Gen. 21. PHYSSOPHORA, Peron.

Body free, gelatinous, vertical, terminated above by an air-vessel; lateral lobes distichous, subtrilobed, vesicular; base of the body truncated, perforated, surrounded by appendages either conical, dilated into lobes, or subdivided and foliated; tentacular filaments more or less long.

P. hydrostatica, Lam. Oval; lateral vesicles three-lobed; four of the larger tentacula red. Inhabits Mediterranean sea.—*Lam.* ii. 476.

Gen. 22. RHIZOPHYZA, Peron.

Body free, transparent, vertical, elongated, terminated above by an air-vessel; and along the stem tentacula, of which some are conical and the others filiform.

R. filiformis, Lam. Body filiform; lateral lobes oblong, pendulous; the animal having the power of contracting itself into a subglobose form. Inhabits the Mediterranean sea.—*Lam.* ii. 478.

Gen. 23. STEPHANOMIA, Peron.

Animal gelatinous, very long, in the form of a leafy garland furnished with long filaments, mixed with lateral appendages.

S. amphitritis, Peron. Body echinated, with acute foliaceous appendages; tentacula rose-coloured. Atlantic ocean.—*Lam.* ii. 462.

This animal is said to present the appearance of a garland of azure crystal floating on the surface of the waves. It raises successively its diaphanous leaflets, resembling the leaves of ivy, with its tentacula extended for prey.

CLASS XIII.—POLYPI, Cuv. Lam.

Gelatinous animals, with elongated contractile body, and an alimentary sac with one opening ; mouth distinct and terminal, surrounded with tentacula or radiated lobes ; the greater number adhering together, and forming compound animals.

THE class of Polypi or Zoophytes is one of the largest and most singular of the Animal Kingdom. Nearly at the lowest step in the animal scale, many of them have the form of plants, accompanied by the simplest organization of parts for a living being capable of reproduction. Destitute of head and eyes, and having no organs for circulation, respiration, or locomotion, the body of the Polypus appears only as a homogeneous substance, constituted of gelatinous and irritable cellular tissue, in which the fluids essential to life move sluggishly. All are, however, furnished with an internal cavity or stomach, with faint traces in some of hollow canals and ovaries. The body is generally cylindrical or conical, gelatinous or transparent ; and the mouth, surrounded by tentacula varying in number and form, serves also for anus. Many of the polypi have the principle of life so diffused in their simple structure, that portions cut from the individual soon acquire in the proper element all the characters of the perfect animal. Most of the same species, besides, form compound animals, adhering to one another by lateral appendages, or by their posterior extremity, and participate in a common life without ceasing to enjoy their individual and independent existence. The mode of reproduction in many individuals of this class is unknown. In general, it may be remarked, that many are conceived to be gemmiferous, or to extend the race by buds in the manner of plants, while others propagate the species by means of ova. In the lowest of the races the distinctive characters of animal life are so faintly drawn, that with difficulty can many of these be distinguished from the Cryptogamic families of the Vegetable Kingdom.

Many of the Polypi have the faculty of forming fixed envelopes, more or less solid, in which they reside. The singular diversity of this envelope, in its own substance inorganic and calcareous, and its accumulation in immense masses in the seas of warm countries, by the combined operations of these animals, is not the least interesting fact in their history. They appear in those countries to multiply with such facility, and in such great abundance, as to become powerful agents in the modification of the surface occupied by the ocean. Islands are reared, and coasts extended, by the incessant multiplication of these animals. M. Lamarck conjectures that even the calcareous mountains and strata of the present surface of the globe may have been formed in the revolution of ages by Polypi; and that future changes in this surface, and in the level of the ocean, are in the course of preparation by these minute animals.

The animals of this class were regarded by the older naturalists as stony vegetables, or vegetating stones, and a number of theories were framed to explain their formation and growth. Their animal nature was first conjectured by Imperati in 1699, proved in 1727 by Peyssonnel, and confirmed in 1740 by the observations of Trembley upon the *Hydræ*. From this period the true knowledge of these animals continued to increase, chiefly through the researches of Ellis. Marsigli, Baster, Donati, Boccone, Degeer, Reaumur, Jussieu, and Cavolini, followed in the path traced out by Ellis; and Linnæus, with the same success which attended his investigations of the other objects of nature, arranged the whole in his class *Vermes*, making them an Order under the name of *Lithophyta*. The classification of this great naturalist, who fixed the characters of the divisions, and described the greatest number of species, forms the basis of what has since been done by Pallas, Bruguière, and Lamarck. Cuvier, in his *Règne Animal*, divides the Polypi into two orders,—the first comprehending the naked Polypi; and the second those which live in polypiferous masses formed by their united labours. The second order is further subdivided into many families. Lamarck, whose system regarding these animals is followed in the present work, divides the class of Polypi into five orders.

I. POLYPI NATANTES.—Tentaculated polypi, united in a common fleshy body on an axis, free, and floating in the water.

II. POLYPI TUBIFERI.—Tentaculated polypi, united in a common fleshy body, destitute of solid internal axis, and covered with tubiform cylinders.

III. POLYPI VAGINATI.—Tentaculated polypi, constantly fixed in an inorganic covering, and forming in general compound animals.

IV. POLYPI DENUDATI.—Tentaculated polypi, not forming a common envelope, fixed either constantly or spontaneously.

V. POLYPI CILIATI.—Polypi destitute of tentacula, but with vibratile ciliæ at or near the mouth.

The habitations of the Polypi, or the common masses formed by their united labours, are more or less calcareous or stony, from the madrepores, of a substance as consistent as shells, to the fibrous or membranous horny envelope of the sponge. Between these extremes are found every variety of consolidation and consistence; but all are formed by animals approaching to one another in their general organization. Polypi are reproduced by ova, or a separation of parts natural or accidental. Their food is chiefly animal, derived, in the case of the smaller species, from the infusory animalculæ which inhabit the waters.

ORDER I.—POLYPI NATANTES.

Polypi united in a common body, free, elongated, fleshy, enveloping an inorganic axis, cartilaginous, osseous, or stony; radiated tentacula around the mouth of each polypus.

The animals of this order possess a common body, distinct from that of the individuals, but in which they necessarily participate. This common body has the appearance of a naked fleshy mass, which is common to all the polypi which protrude from its surface; and in the centre is an inorganic axis, resulting from some deposition of the animals, in the same manner as the outer covering is formed in the other orders. According to Cuvier, the alimentary canal of the genus *Veretillum* is furnished with many vascular cœcums spread over the fleshy mass, and by which the polypi communicate. Some of these compound animals float freely in the water, and others remain at the bottom in the mud or sand. Many of them are phosphorescent.

Gen. 1. UMBELLULARIA, Lam.—*Pennatula*, Lin.

Body free, consisting of a long simple stem, with a bony inarticulated axis, enveloped by a fleshy membrane; polypi large, united in an umbellate form, with each eight ciliated tentacula.

- U. *Greenlandica*, Lam. Stem long, attenuated above, the polypi crowded in an umbel at the apex. Inhabits Northern Ocean.—*Ellis, Coral. pl. 37, fig. a, b, c.*

Gen. 2. VIRGULARIA, Lam.—*Pennatula*, Mull.

Body free, linear or filiform, very long, surrounded in part by polypiferous pinnulæ, and containing a stony axis; pinnules numerous, small, distichous, and transverse, surrounding the stem at the top.

- V. *mirabilis*, Lam. Stem filiform, branches distinctly pinnated; pinnæ transverse, arched, lax, the margin polypiferous. Inhabits Northern Ocean.—*Lam. ii. 430.*

Gen. 3. RENILLA, Lam.

Body free, flattened, reniform, pediculate, with one of its faces polypiferous, and striated rays on the other; polypi with six rays.

- R. *Americana*, Lam. (*Pen. reniformis*, Soland.) Colour red. Inhabits American seas.—*Ellis, Zooph. 65.*

Gen. 4. PENNATULA, Lam.

Body free, fleshy, penniform, with a stem naked inferiorly, winged at its upper part, and containing a cartilaginous or osseous axis; pinnulæ distichous, open, flattened, plicated, and polypiferous in their upper margin; polypi with radiated tentacula.

- P. *phosphorea*, Lin. Stem round, fleshy, long, papillous below, and scabrous; pinnæ of the margin pectinated; colour reddish or whitish. Inhabits British seas.—*Ellis, Zooph. 61.*

Gen. 5. FUNICULINA, Lam.—*Pennatula*, Pall.

Body free, filiform, very simple, long, fleshy, and furnished with warts or polypiferous papillæ disposed in longitudinal rows; axis slender, horny, or sub-stony in the centre; polypi solitary upon each wart.

- F. *cylindrica*, Lam. Elongated, smooth, soft; papillæ bifarous, alternate, turbinate, ascending; axis subcapillary. Inhabits American Ocean.—*Lam. ii. 423.*

Gen. 6. VERETILLUM, Lam.—*Pennatula*, Pall.

Body free, fleshy, simple, cylindrical, polypiferous in its upper part, with the base naked, and more or less coriaceous; polypi sessile, and thickly placed on the common body; eight ciliated tentacula at the mouth.

- V. *phalloides*, Lam. Stem cylindrical, subclavate, naked, with polypi on all sides of the upper half; axis subulate, linear, and quadrangular. Inhabits Indian Ocean.—*Lam. ii. 421.*

ORDER II.—POLYPI TUBIFERI.

Polypi united in a common fleshy body, either simple, lobed, or ramified, and constantly fixed by its base; no solid internal axis; surface entirely or in part covered with tubiform cylinders, rarely retractile; mouth terminal, with eight pectinated tentacula.

The Polypi of this order appear in the form of a fleshy subgelatinous body, always fixed by its base, more or less simple, convex, lobed, or slightly ramified. The surface of the body, or at least the upper part, is covered with a vast number of small tubiform moveable cylinders, pierced at their summit by a round sub-octagonal mouth surrounded by eight large pectinated tentacula. Each individual is composed of many viscera enclosed in a cylindrical tube formed of two coats, between which cellular substance is interposed. After covering the particular animal these coats join in enveloping the common mass. The interior is fleshy, and appears sometimes to be furnished with longitudinal and annular fibres. The interior tunic of each animal has eight large longitudinal and converging folds, which divide the cavity into as many parts. The mouth communicates by a short and broad œsophagus with the stomach. The polypi are also furnished with eight intestinal processes, six of which seem connected with an equal number of ovaries.

Gen. 1. LOBULARIA, Lam.—*Acyonium*, Lin.

Common body fleshy, elevated upon the base, rarely supported by a short stem, simple, or furnished with lobes; surface thickly furnished with polypi; polypi entirely retractile, cylindrical, with eight grooves without, and eight pectinated tentacula.

L. digitata, Lam. Sessile, ferruginous white, gelatinous, fleshy, lobed; the lobes from two to five, thick and obtuse. Inhabits European coasts.—*Ellis, Coral. pl. 32, fig. a, A, A 2.*

Gen. 2. CLIONA, Grant.

Substance fleshy, irritable, with siliceous spicula; imbedded in cavities of shells, and protruding tubular contractile papillæ, on the margin of which are placed cylindrical polypi with eight tentacula.

C. celata, Grant. Flesh yellow, spicula cylindrical, tubular, closed, slightly curved, pointed at one end, and terminated by a small hollow round head at the other. Inhabits old oyster shells.—*Fleming, Brit. Animals, 516.*

Gen. 3. AMMOTHEA, Lam.

Common body divided into many short and branched stems, with the last branches clustered, oval-conoid, and covered with polypi; polypi not retractile; body short, and with eight pectinated tentacula on the sides.

A. virescens, Savig. Stem white, very much branched; polypi fuscous greenish. Inhabits coasts of the Red Sea.—*Lam. ii. 411.*

Gen. 4. XENIA, Lam.

Common body with thick shortish naked stems arising from the

base and divided at their summit, polypiferous at their extremity ; polypi not retractile, cylindrical, fasciculated, in the form of an umbel, and clustered at the summit of the branches into globular heads, with eight large deeply pectinated tentacula.

X. umbellata, Sav. Polypi deep blue, forming an umbellated head ; tentacula long, deeply pectinated. Red Sea.—*Lam.* ii. 410.

Gen. 5. ANTHELIA, Lam.

Common body extended in a thin plate, or flattened over marine bodies ; polypi not retractile, projecting, straight and crowded, occupying the surface of the common body ; eight pectinated tentacula.

A. glauca, Sav. Polypi green, subventricose below. Inhabits coasts of the Red sea.—*Lam.* ii. 408.

ORDER III.—POLYPI VAGINATI.

Individual polypi tentaculated, constantly fixed in an inorganic body which envelopes them, and forming in general compound animals.

The animals of this order, including the greater portion of the class, in general grouped or agglomerated together, and communicating among themselves by their base, participate in a common life. They are delicate, transparent, very contractile, and are in general fixed to the inorganic body which they themselves form. This body is increased in size as the polypi multiply by successive generations ; and the islands raised in the middle of the ocean by these minute animals have no limits to their breadth or length, and are only bounded in their height by the erection rising above the level of the water which supplies them with food.

These Polypi are contained in cells of the substance which they form in common, and although they adhere to one another posteriorly or to the common mass, each individual is almost always isolated in its particular cell. The basal mass is membranous, horny or flexible, or in whole or part calcareous, and of stony hardness. The animals have almost all tentacula disposed in a radiated form around their mouth, either simple, dentated, or ciliated, and in various number. These tentacula serve as a kind of arms to direct their food to the mouth. The ova are deposited on the margin of their cells or dropped around, either naked or in particular vesicles ; and thus the common body goes on to augment in size by the production of successive generations. The cells of the polypi are short, long, or tubular, with a regular or irregular orifice, and the interior walls, simple, striated longitudinally, or lamellated and stelliform.

For a long period these polypiferous masses were conceived to be marine plants, and they were accordingly arranged as a portion of the Vegetable Kingdom by Tournefort. Peyssonnel in 1727, however, discovered that the corals constituted the habitation of minute animals : Trembley extended the discovery to the polypi of fresh water ; Ellis, whose works still contain the standard information on many of these tribes, discovered that analogous animals inhabited the Sertulariæ, the Escharæ, Gorgoniæ, &c. ; and these bodies of uncertain derivation, as the Madreporæ and Milleporæ, were thus traced to be the abodes and the work, like the nest of the wasp and the comb of the bee, of one of the most imperfect races of animals.

As the form and consistence of the masses formed by the polypi, as well as their own structure, is considerably varied, Lamarck has arranged the animals of this class into seven sections, in the first two of which the polypiferous mass is composed of

two separate substances ; and in the other five of one substance only variously combined.

SECTION I.

Polypiferous masses composed of two distinct parts ; 1. of numerous horny fibres, either in bundles, radiated, interlaced, crossed, or felted together ; and 2. of a fleshy or gelatinous pulp, which covers, envelopes, or attaches the fibres, contains the polypi, and takes in drying a consistence more or less firm.

The fibrous portions of the masses formed by the polypi of this section are of various degrees of consistence, according to the species, and serve in place of an axis for the support of the pulpy or gelatinous portion common to the whole individuals, and the result of their joint labour. In some the fibrous portion becomes of excessive tenuity, and is scarcely to be traced ; but the pulpy mass becomes on drying firm and coriaceous, porous and celluliferous, according to the nature of the animal.

Gen. 1. ALCYONIUM, Lam.

Polypiferous masses polymorphous, soft or fleshy in the fresh state, more or less firm, hard, or coriaceous when dried, composed of very small horny fibres, interlaced and glued together by a persistent pulp ; osculi generally apparent, and variously disposed at the surface ; polypi commonly with eight tentacula.

A. vesparium, Lam. Fixed, erect, large, ovate-oblong, the apex obtuse ; cavernous within ; osculi crowded on the surface. Inhabits African and Indian seas.—*Lam.* ii. 393.

Gen. 2. GEODIA, Lam.

Polypiferous mass free, fleshy, tuberous, hollow interiorly, firm and hard in the dry state, with the exterior surface everywhere porous ; a cluster of isolated openings larger than the pores on the lateral face.

G. gibberosa, Lam. Roundish, gibbous, with swellings and tubercles.—*Lam.* ii. 388.

Gen. 3. TETHIA, Lam.—*Alcyonium*, Mull.

Polypiferous mass knotty, subglobular, very fibrous interiorly, the fibres subfasciculated, diverging or radiating from the interior to the circumference, and agglutinated together by a pulp ; cells in the crust horizontal ; osculi rarely perceptible, caducous.

T. cranium, Lam. Tuberiform, white, villous. Inhabits seas of Norway.—*Lam.* ii. 386.

Gen. 4. SPONGIA, Lam.

Polypiferous mass fixed, soft, gelatinous, tenacious, very flexible, the cartilaginous matter supported by calcareous or siliceous spicula ; pores very numerous, irregular.

The investigations of Professor Grant have thrown much light on the structure and formation of the animal of the sponge. The polypiferous mass consists of an

albuminous and gelatinous matter connected internally with anastomosing canals. The skeleton is either simple, consisting of horny fibres, as in the species used for domestic purposes ; or compound, being in this case furnished with calcareous or siliceous spicula. The gelatinous matter, abounding in transparent globules, connects the different parts of the skeleton, lines the canals, and forms the margin of the pores or openings. The water enters by the pores or mouth, and is ejected by other larger orifices, elevated in some species above the surface in the form of papillæ. The ova are numerous, float at first in the water, the anterior portion being covered by ciliæ, and finally fix themselves. Dr Fleming in his *British Animals* arranges the sponges into four genera, *Tethya*, *Halichondria*, *Spongia*, and *Grantia*, the last after the name of the zealous naturalist who has so successfully investigated the structure of the genus. The first two have their mass supported by siliceous spicula ; the third is cartilaginous ; and the fourth is supported by calcareous spicula. Lamarck's arrangement is followed in this summary.

1. *Masses sessile, simple, or lobed.*

S. communis, Lam. Sessile, subturbinated, rounded, slightly convex above, soft, tenacious, with wide pores ; foramina large. Inhabits Indian Ocean.—*Lam. ii. 353.*

S. lacinulosa, Lam. Sessile, subturbinated, flattish, obsoletely lobed ; soft, tomentose, very porous ; surface thickly laciniate. Inhabits Indian Ocean.—*Lam. ii. 353.*

2. *Masses subpediculated, or narrowed at their base, simple or lobed.*

S. angulosa, Lam. Erect, subturbinated, very porous, with lateral angles of unequal forms ; foramina crowded at the margin of the angles. Inhabits seas of New Holland.—*Lam. ii. 358.*

3. *Masses pediculated, flattened, flabelliform, simple or lobed.*

S. flabelliformis, Lam. Erect, pediculated, flat, suborbicular ; fibres rigid, elegantly reticulated, with waved furrows. Inhabits Indian Ocean.—*Lam. ii. 360.*

4. *Masses concave, widened, hollowed, or funnel-shaped.*

S. usitatissima, Lam. Turbinated, tenacious, soft, tomentose, very porous ; laciniae slightly scabrous ; concave above. Inhabits American seas. Employed for domestic purposes.—*Lam. ii. 363.*

S. ventilabra, Lin. Widely funnel-shaped, with woody veins ; rough and brittle when dry. Inhabits Northern seas.—*Wern. Mem. ii. pl. 15, fig. 1.*

5. *Masses tubular or fistulous.*

S. tubulosa, Lam. Tubular, branching, fibrous ; fibres sub-naked, reticulated or interwoven. Inhabits Indian seas.—*Ellis, Zooph. pl. 58, fig. 7.*

6. *Masses foliaceous, or divided into flattened lobes.*

S. laciniata, Lam. Leafy, sessile, soft, white ; laminae many, erect, in bundles, deeply cut ; pores scattered. Inhabits Indian seas.—*Lam. ii. 374.*

7. *Masses branched, ramifications distinct.*

S. arborescens, Lam. (*S. rubens*, Pall.) Branched, rigid, finely porous ; branches subcompressed, the apex digitate ; foramina distant. Inhabits American seas.—*Lam. ii. 374.*

S. palmata, Lam. Erect, compressed, very porous ; branches pal-

mated, digitiform, apex furcated, subacute. Inhabits seas of Europe.—*Ellis, Zooph.* pl. 58, fig. 6.

Extinct species of Sponges are found in Britain in the chalk formation.

Gen. 5. FLABELLARIA, Lam.—*Corallina*, Soland.

Polypiferous mass caulescent, flabelliform, incrustated, often divided, with the expansions flattened, subarticulated, proliforous; stem short, cylindrical; tissue composed of interlaced fibres; articulations subreniform, broader than long, with the upper margin rounded and sinuous.

F. pavonia, Lam. (*C. flabellum*, Soland.) Stem simple, incrustated; branches agglutinated; flabelliform leaf incrustated, waved, sublobed. Inhabits American seas.—*Ellis, Zooph.* pl. 24, fig. A, B.

F. incrassata, Lam. Stem short; branches jointed, trichotomous; joints compressed, incrustated; the inferior wedge-shaped, the upper reniform. Inhabits West Indian seas. *Ellis, Zooph.* pl. 20, fig. d, d 1-3, D 1-6.

Gen. 6. PENICILLUS, Lam.—*Corallina*, Pall.

Polypiferous mass with a simple stalk, incrustated exteriorly, filled interiorly with numerous horny fibres in bundles, and divided at its summit into a cluster of filiform dichotomous and articulated branches.

P. capitatus, Lam. (*C. penicillus*, Soland.) Stem smoothly incrustated; branches fasciculate, and crowded into a thick, dichotomous, articulated, and filiform head. Inhabits American seas.—*Ellis, Zooph.* pl. 25, fig. 4-6.

SECTION II.

Polypiferous masses branched like plants, composed of two kinds of substance, a central and solid axis, and a fleshy incrustation, which covers and contains the polypi; axis inorganic, corneous or stony; polypiferous crust when dried porous, cellular, and friable.

The Polypi of this section inhabit a fleshy crust surrounding an inorganic axis formed by themselves. This fleshy covering is full of cells or pores, each the habitation of an animal, possessing an individual and common life. The common dwelling is raised from a flattened base attached to marine bodies, in the form of a tree or shrub; and from the general appearance of the branched and reticulated masses, it was natural for the earlier observers to conclude that such objects belonged to the vegetable kingdom.

Gen. 7. CORALLINA, Lam.

Polypiferous mass fixed, much branched, composed of a central axis, and an interrupted incrustation; axis filiform, inarticulated, solid, cartilaginous, or horny; incrustation calcareous, dense, united at the surface without distinct cells, interrupted, and as if jointed longitudinally; polypi unknown.

The Corallines have in general the appearance of small tufts or bushes beautifully branched and attached by their own base, very much resembling plants in the manner of their growth. The polypous inhabitants are very minute, and their cells on the surface scarcely perceptible. M. Lamouroux, however, has observed minute fibrillæ

projecting from the crust, which were retracted on the slightest agitation of the water. Lamarek divides the genus into three sections, of which M. Lamouroux makes as many genera.

1. *Dichotomous, with short joints, dilated and often compressed above.*

C. officinalis, Lin. Trichotomous, greenish coloured ; branches pinnated ; pinnulæ distichous, cylindrico-clavate, the terminal ones subcapitate ; joints of the stem and branches wedge-shaped, compressed. Inhabits European coasts. B.—*Ellis, Coral. pl. 24, No. 2, fig. a, A. Plate 8, fig. 4.*

C. squamata, Lam. Sub-trichotomous ; branches pinnated, apex dilated ; smaller branches narrow, slightly depressed ; joints of the stem and branches wedge-shaped, compressed, the last ones flat, with an acute margin. Inhabits English coasts.—*Ellis, Coral. pl. 24, No. 4, fig. c, C. Plate 8, fig. 5.*

C. rosea, Lam. Much branched, purple rose coloured ; branches subpinnated ; pinnulæ in the form of ciliæ ; joints of the branches short and thick. Inhabits Southern Ocean.—*Lam. ii. 331.*

2. *Capillary, subdichotomous, with cylindrical joints.*

C. rubens, Lin. Capillary, dichotomous, mossy in appearance ; branches filiform, with cylindrical joints, the last subclavate, sometimes bilobed. Inhabits European coasts.—*Ellis, Coral. pl. 24, No. 5, fig. e, E. Plate 8, fig. 6.*

C. cristata, Lin. Dichotomous, much branched, capillary ; branches in bundles, cymose and crested ; joints small, smooth. Inhabits European Ocean.—*Ellis, Coral. pl. 24, No. 7, fig. f, F.*

3. *Branched, dichotomous or verticillate, with elongated separated joints, exposing the corneous axis.*

C. anceps, Lam. Dichotomous, much branched, lower joints round, the upper elongated, two-edged, dilated above. Inhabits Southern seas.—*Lam. ii. 333.*

C. cylindrica, Lam. Dichotomous, much branched, slender, white ; joints cylindrical, subequal ; ramuli furcated at the apex. Inhabits American seas.—*Ellis, Zooph. pl. 22, fig. 4.*

Gen. 8. GORGONIA, Lin.

Polypiferous mass fixed and branching, composed of a central axis and an outer bark ; axis fixed at the base, caulescent, branched, substriated without, solid, horny and flexible ; fleshy crust covering the axis and its branches, and containing poly-pi in its fresh state ; spongy, porous, and friable when dried, and covered with superficial or projecting cells.

The species of *Gorgoniæ* are numerous ; but their distinctive characters have not been well determined.

1. *Cells superficial, in the form of projecting granulations or tubercular.*

G. flabellum, Lin. Much branched, fan-shaped, reticulated, the ramuli thick, subcompressed, caulescent ; osculi small, scattered.

Inhabits Indian, American, and Mediterranean seas.—*Ellis, Cor.* pl. 26, fig. A.

- G. verriculata*, Lam. Branched, fan-shaped, very large; ramuli divaricate, joined at the reticulations; crust white, pores warty, scattered. Inhabits Indian seas. One of the largest species.—*Ellis, Zooph.* pl. 17.

2. *Cells cylindrical or turbinated, much projecting.*

- G. lima*, Lam. Branching, dichotomous, whitish; papillæ small, densely clustered, branches compressed at the axis. Inhabits West Indian seas.—*Lam.* ii. 322.

- G. lepadifera*, Lin. (*G. reseda*, Pall.) Branching, dichotomous; papillæ clustered, reflexed, campanulate, squamose, subimbricated. Inhabits Northern seas.—*Ellis, Zooph.* pl. 13, fig. 1, 2.

Gen. 9. ANTIPATHES, Lam.

Polypiferous mass fixed, branched, composed of a central axis and outer crust; axis with a foot, and fixed by the base, caulescent, simple or branched, corneous, solid, flexible, generally rough with small spines; crust gelatinous, polypiferous, covering the axis and its branches when alive, but fugacious, or disappearing when taken out of the water.

In the animals of this genus the gelatinous crust disappears almost entirely when taken from the water, and is not like that of the *Gorgonia* persistent in the dried state. The persistent spines in the *Antipathes* also serve to distinguish the two genera.

- A. spiralis*, Lam. Simple, scabrous, long, subspiral. Inhabits Indian Ocean.—*Ellis, Zooph.* pl. 19, fig. 1—6.

- A. cupressus*, Lam. (*Gorgonia abies*, Lin.) Scabrous, somewhat branching; ramuli lateral, short, scattered, recurved, bipinnate. Inhabits Indian Ocean.—*Ellis, Zooph.* 103.

Gen. 10. ISIS, Lam.

Fixed, of a tree-like form, composed of a jointed axis, and an outer crust; central axis branched, forming stony striated articulations, horny between the joints; crust containing poly-pi in the fresh state, but fugacious and disappearing in whole or in part when withdrawn from the water.

- I. hippuris*, Lin. Slightly branched; crust smooth, thick, with many osculi; joints of the axis stony, sulcated, irregular, the last compressed; intervals horny. Inhabits Indian seas.—*Ellis, Zooph.* pl. 3, fig. 1—5. *Plate 8, fig. 7, 8.*

- I. dichotoma*, Pall. Branched, filiform, jointed, diffuse; joints stony, nearly smooth; internodes narrow. A small species. Inhabits Indian seas.—*Petiv. Gaz.* pl. 3, fig. 10.

Gen. 11. MELITÆA, Lam.—*Isis*, Lin.

Fixed, in the form of a shrub, composed of a jointed knotty axis, and a persistent crust; central axis caulescent, branched, formed of stony substriated joints, with the intervals spongy and

gibbous; crust cortical, containing polypi in the fresh state; thin, celliferous, and persistent when dried.

M. ochracea, Lam. Sub-dichotomous, much branched, nearly smooth, nodose at the bends; branches and ramuli erect, flexuose, free; of various colour.—*Ellis, Zooph.* 105.

M. retifera, Lam. (*Isis aurantia*, Esper.) Stem thick, branching, nodose at the bends; branches divaricate, flexuose, sub-reticulated, thickly verrucose. Varied in colour; chiefly yellowish or purple. Inhabits Indian Ocean.—*Lam.* ii. 299.

Gen. 12. CORALLIUM, Lam.—*Isis*, Lin.—*Gorgonia*, Soland. Fixed, branched, not articulated, stiff; axis caulescent, branching, stony, solid, striated at the surface; crust soft and fleshy in the recent state, in which are the polypi; thick, porous and reddish when dried; eight ciliated and radiated tentacula at the mouth of the polypi.

This genus is distinguished from *Isis* in not being articulated; and the species forms the coral of commerce. The axis or central portion is stony and solid, with a smooth vitreous fracture, finely striated. It much resembles red wax. The coral is fixed by its base to marine bodies, and always in a pendant or reversed position.

C. rubrum, Lam. (*Isis nobilis*, Lin. *G. pretiosa*, Soland.) Bright-red, rose-coloured, or whitish. Mediterranean and Indian seas, and fished up as an article of commerce for the manufacture of necklaces, &c.—*Ellis, Zooph.* pl. 13, fig. 3, 4. Plate 8, fig. 9.

SECTION III.

Polypiferous masses stony, with stelliform lamellæ or waved laminar furrows.

The Lamelliferous Polypi are extremely numerous in species, and much diversified in point of form. The polypiferous cells are sometimes in the form of lamellar stars radiated from a centre, and at others in waved furrows, irregularly prolonged into compartments, and furnished with lateral plates. The large masses of calcareous matter accumulated by the polypi of this section in strata or plates rising above one another and spreading around, form a great portion of the submarine rocks in many seas; and the constant increase of successive generations often raises the united structure above the level of the water. Hence the origin of many islands, and the often observed variation of depth in the seas of warm climates. It has been conjectured that these powerful but minute agents exercise a mighty effect in the formation of calcareous rocks and in changing the level of the ocean; and that many of the calcareous mountains of the present land, may have been originally the work of these submarine artificers. In those which have been observed in the recent state the gelatinous and animal crust on the surface seems continuous, and furnished with the stellated tentacula of the polypiferous inhabitant. It is about a line in thickness when the animals are expanded, but totally withdrawn into the cells at the slightest touch. Lamarck divides the Lamelliferous Polypi into those which have the stellated mouths terminal, and those which have them lateral or spread over the surface.

1. Stars lateral, or spread over the surface.

Gen. 13. OCULINA, Lam.—*Madrepora*, Lin.

Polypiferous mass stony, generally fixed, branching; the branches smooth, thick and very short; some of the stelliform mouths terminal, the others lateral and superficial.

O. virginea, Lin. Much branched, subdichotomous, milk-white;

branches tortuous, coalescing ; stars scattered, some immersed, others prominent, formed by lamellæ. Inhabits Indian and Mediterranean seas.—*Ellis, Zooph.* pl. 36.

O. prolifera, Lam. Branched, subdichotomous ; stars turbinated ; margin proliferous. Norwegian Sea.—*Ellis, Zooph.* pl. 32, fig. 2.

Gen. 14. SERIATOPORA, Lam.—*Madrepora*, Pall.

Fixed, stony, branching; branches slender, subcylindrical; cells perforated, lamellar, as if ciliated on the margin, and disposed laterally in transverse or longitudinal series.

S. subulata, Lam. (*M. seriata*, Pall.) Much branched, diffuse ; branches slender, subulate ; stars in a longitudinal series, with a prominent and ciliated margin.—*Ellis, Zooph.* pl. 31, fig. 1, 2.

Gen. 15. MADREPORA, Lam. Lin.

Fixed, subdendroidal, branching, the surface furnished on all sides with projecting cells ; interstices porous ; cells scattered, distinct, cylindrical, tubular, scarcely stelliferous, projecting ; laminæ very narrow.

M. palmata, Lam. Broad, flattened, base convolute, deeply divided, muricated on both sides ; branches palmated or deeply cleft. Inhabits American seas.—*Sloane, Hist. Jam.* i. pl. 17, fig. 3.

M. corymbosa, Lam. Much branched, orbicular ; branches ascending ; ramuli many, spread out in a broad and oblique corymb ; tubular cells unequal, crowded, and striated without. Inhabits Indian Ocean.—*Rumph. Amb.* pl. 86, fig. 2.

Gen. 16. POCILLOPORA, Lam.

Fixed, stony, branched or lobed, the surface furnished on all sides with hollow cells with the interstices porous ; cells scattered, distinct, the margin rarely projecting, and the stellæ scarcely apparent.

P. acuta, Lam. (*Madrepora damicornis*, Soland.) Much branched ; branches divided, slender ; ramuli acute ; stellæ crowded, hollow, obsoletely lamellated. Indian Ocean.—*Ellis, Zooph.* 170.

Gen. 17. PORITES, Lam.—*Madrepora*, Soland.

Fixed, stony, branched or lobed and obtuse ; surface stelliferous ; stellæ regular, sub-contiguous, superficial or excavated, the margins imperfect or none ; filamentous laminæ sharp or pointed.

This genus, though varying in general form, is to be distinguished by their dichotomous and obtuse lobes, sometimes slightly compressed on the sides, and by the stellæ being superficial, more or less contiguous, and imperfectly or not circumscribed. It is numerous in species.

P. clavaria, Lin. (*M. porites*, Lin.) Dichotomously branched ; ramuli thick, subclavate, obsoletely compressed ; stellæ broad, flat-tish, contiguous, superficial. Inhabits American and Indian seas. *Ellis, Zooph.* pl. 47, fig. 1.

P. furcata, Lam. Cespitose, many-stemmed, branched dichotomously; ramuli short, furcated; stars contiguous, small, hollowed. *Lam.* ii. 271.

Gen. 18. *ASTREA*, Lam.—*Madrepora*, Soland.

Fixed, stony, incrusting marine bodies, or forming a hemispherical or globular mass, rarely lobed; upper surface crowded with orbicular or subangular lamellar and sessile stars.

* *Stars separated from the base.*

A. radiata, Lam. Stars orbicular, concave, the margin elevated; lamellæ narrow, the interstices sulcated. Inhabits American seas.—*Ellis*, *Zooph.* pl. 47, fig. 8.

A. Argus, Lam. Stars large, orbicular, with many rays; margin elevated, obtuse, and radiated exteriorly. Inhabits American seas.—*Lam.* ii. 259.

** *Stars contiguous.*

A. favosa, Lam. Subglobose; stars large, concave, unequal, angular; margin subacute; walls multi-lamellar; lamellæ dentated. Inhabits Indian Ocean. This species is found fossil in France.—*Lam.* ii. 263.

A. denticulata, Lam. Stars unequal; marginal lamellæ elevated, alternately large and small; cells contiguous, without interstices at their base. Indian Ocean.—*Ellis*, *Zooph.* pl. 49, fig. 1.

Gen. 19. *EXPLANARIA*, Lam.

Fixed, stony, developing a free foliaceous membrane, waved and sublobed, with one stelliferous face; stars scattered, sessile, more or less separated.

E. infundibulum, Lam. Turbinated, infundibuliform, proliferous within. Inhabits Indian Ocean.—*Lam.* ii. 255.

E. mesenterina, Lam. (*M. cinerascens*, Ellis.) Variouslly convoluted, twisted and sinuous; interstices of the stars porous. Inhabits Indian Ocean.—*Ellis*, *Zooph.* pl. 43.

Gen. 20. *ECHINOPORA*, Lam.

Fixed, stony, flattened and extended into a free membrane, rounded, filiform, and finely striated on both sides; upper surface crowded with small papillæ, and convex orbicular stellæ; papillæ pierced with one or two holes, each covering a lamellated star; stars scattered, orbicular, covered.

E. rosularia, Lam. Flattened, foliaceous, suborbicular; the upper surface covered with sharp and orbicular striæ, the lower smooth, striated. Inhabits Seas of New Holland.—*Lam.* ii. 254.

Gen. 21. *MONTICULARIA*, Lam.

Fixed, stony, incrusting marine bodies, united into a subglobular gibbous or lobed mass, or subfoliaceous expansions; up-

per surface rough with elevated pyramidal stellæ ; stars conical, with a solid central axis, simple or dilated, around which the radiating laminæ adhere.

M. folium, Lam. Flattened, foliaceous, lobed, subconcave ; cones unequal, smaller in the disc, dilated and compressed on the margin ; under surface radiated. Inhabits Indian seas.—*Lam.* ii. 250.

There are several fossil species of this genus.

Gen. 22. MEANDRINA, Lam.—*Madrepora*, Lin.

Fixed, stony, forming a simple convex or hemispherical mass ; surface convex, occupied by compartments more or less hollow, sinuous, and furnished on each side with transverse parallel plates which adhere to the raised crests.

M. labyrinthica, Lam. Hemispherical ; whorls long, tortuous, with the base dilated ; eminences simple, subacute. Inhabits American seas.—*Ellis*, *Zooph.* pl. 46, fig. 3, 4. *Plate* 8, fig. 10.

M. cerebriformis, Lam. Subspherical ; whorls tortuous, elongated ; lamellæ dilated at the base and denticulated ; eminences truncated, sub-bicarinated. American seas.—*Shaw*, *Nat. Mis.* iv. pl. 118.

Gen. 23. AGARICIA, Lam.—*Madrepora*, Pall.

Fixed, stony, with flattened subfoliaceous expansions, and one surface furnished with furrows or stelliferous wrinkles ; stars lamellar, sessile, often imperfect and indistinct.

A. ampliata, Lam. Foliations fan-shaped, longitudinally rugose ; rugæ carinated, lamellose, serrated, rough ; stars in small number, and imperfect, Indian seas.—*Ellis*, *Zooph.* pl. 41, fig. 1, 2.

Gen. 24. PAVONIA, Lam.—*Madrepora*, Lin.

Fixed, stony, frondescant, with flattened subfoliaceous lobes, straight or ascending, having the two surfaces furnished with grooves or stelliferous wrinkles ; stars lamellar, sessile, more or less imperfect.

P. agaricites, Lam. Fronds short, thick, semi-rotund, diffuse ; wrinkles stelliferous, acute, transverse flexuose. Inhabits American seas.—*Ellis*, *Zooph.* pl. 63.

2. Stars terminal.

Gen. 25. FUNGIA, Lam.—*Madrepora*, Lin.

Stony, free, simple, orbicular or oblong, convex and lamellar above, with an oblong hollow in the centre ; concave and uneven below ; one lamellar subproliferous star on the upper surface, with the laminæ dentated or spinous laterally.

F. agariciformis, Lam. (*M. fungites*, Lin.) Orbicular, scabrous below ; stars convex, lamellæ unequal, denticulated, the greater number radiated longitudinally. Inhabits Red and Indian Seas.—*Ellis*, *Zooph.* pl. 28, fig. 5, 6.

F. limacina, Lam. (*M. pileus*, Lin.) Oblong, convex, concave, and echinated below; stars elongated, lamellæ unequal. Inhabits Indian seas.—*Ellis, Zooph. pl. 45.*

Gen. 26. CYCLOLITES, Lam.—*Madrepora*, Lin.

Stony, free, orbicular, or elliptic, convex, and lamellar above, hollow in the centre, flattened below, with circular concentric lines; a single lamellated star occupying the upper surface; the laminæ very fine and entire.

C. numismalis, Lam. (*M. porpita*, Lin.) Orbicular, a convex lamellar star above, hollow in the centre, rounded. Inhabits Indian seas, and found fossil.—*Lam. ii. 233.*

Other fossil species of this genus have been found in France, &c.

Gen. 27. TURBINOLIA, Lam.

Polypiferous mass free, simple, turbinated or cuneiform, pointed at the base, striated longitudinally without, and terminated by a lamellated and stellular cell, sometimes oblong.

The species of this genus are all fossil.

Gen. 28. CARYOPHYLLIA, Lam.—*Madrepora*, Lin.

Polypiferous mass stony, simple or branched, with the stem and branches subturbinated, striated longitudinally, and each terminated by a lamellar star-shaped cell.

In some species the stem is simple, isolated, and with but one terminal star; in others it is fasciculated, or with a number of agglomerated stems, each terminated by a stellated cell; while in many others the stem is divided into branches, each branch terminated in a stelliform cell. The stem and branches are cylindrical, sometimes turbinated, and always striated longitudinally. The polypi are elongated, and furnished each with eight plumose and radiated tentacula.

* *Stems simple, solitary or fasciculated.*

C. cyathus, Lam. Stem solitary, clavato-turbinate; star concave, the centre papillose. Inhabits Mediterranean sea.—*Ellis, Zooph. pl. 28, fig. 7.*

C. fasciculata, Lam. Cylindrical, clavato-turbinate, longish, the laminæ of the stars projecting. Inhabits Indian Ocean, and found fossil in Europe.—*Ellis, Zooph. pl. 30.*

** *Stems divided or branched.*

C. flexuosa, Lam. Stems cylindrical, branched, flexuose, in agglomerated rounded bundles. Inhabits Indian Ocean.—*Ellis, Zooph. pl. 32, fig. 1.*

C. angulosa, Lam. Cespitose; branches short, erect, thick; stellæ orbicular, sinuous, irregular. American seas.—*Lam. ii. 229.*

Gen. 29. SARCINULA, Lam.—*Madrepora*, Lin.

Stony, free, forming a polypiferous simple and thick mass, composed of united tubes; tubes numerous, cylindrical, parallel, vertical, united in bundles by intermediate and transverse partitions; radiated laminæ in the interior of the tubes.

S. organum, Lam. Tubes cylindrical, erect, separated, aggregated in a thick mass; external and transverse laminæ connecting the tubes. Inhabits the Red Sea, and found fossil on the coasts of the Baltic.—*Lam. ii. 223.*

Gen. 30. STYLINA, Lam.

Stony, forming simple masses, rough exteriorly; tubes numerous, cylindrical, fasciculated, united, containing laminæ radiating on a solid axis; axis styliform, projecting beyond the tubes.

S. echinulata, Lam. Thick, fasciculated, composed of vertical tubes, sessile; rough with pointed styles above. Inhabits South seas.—*Lam. ii. 221.*

SECTION IV.

Polypiferous mass stony, solid, compact interiorly; cells perforated or tubular, and destitute of laminæ.

The Polypi of this section are rather to be considered aggregated than compound animals, as the structure of the mass seems to make it impossible they could communicate together. They assume various forms; sometimes simply incrusting marine bodies, or forming irregular lobed masses, more or less finely divided, or with branched expansions in the form of plants. The cells appear as simple openings, nearly cylindrical, with smooth or sometimes striated walls.

Gen. 31. TUBIPORA, Lin.

Stony, composed of cylindrical tubes, straight, parallel, individually separate, but joined by external and transverse partitions: tubes articulated, communicating by radiating and porous partitions.

T. musica, Lin. Tubes cylindrical, distinct, the partitions distant; colour bright red; polypi tentaculated, fringed, and of a fine green colour. Indian seas.—*D'Argenv. pl. 4, fig. A. Ellis, Zooph. pl. 27. —Plate 8, fig. 11.*

Gen. 32. CATENIPORA, Lam.

Stony, composed of parallel tubes, inserted in the thickness of vertical plates, anastomosed like net-work.

The species of this genus are fossil and found on the shores of the Baltic.

Gen. 33. FAVOSITES.

Stony, simple, of variable form, composed of parallel prismatic tubes disposed in bundles; tubes contiguous, pentagonal or hexagonal, more or less regular, rarely articulated.

F. alveolata, and *Gothlandica*, both fossil.

Gen. 34. MILLEPORA, Lam.

Stony, solid interiorly, polymorphous, branched or frondescent, furnished with simple pores; pores cylindrical, in general very small, sometimes scarcely apparent, perpendicular to the axis or to the expansions of the polypiferous mass.

The Millepores are stony masses of various shapes, frondescent, flattened, or ramified according to the species.

* *Polypiferous pores always apparent.*

M. complanata, Lam. Compressed, broad; lobes erect, plane, plicated, and the apex divided; pores scattered, obsolete. One of the largest of the genus. Inhabits American seas.—*Lam. ii. 201.*

M. alcicornis, Lin. In loose subramose tufts with foliated palmations; laciniae acute; pores scattered, very small. Inhabits West Indian seas.—*Lam. ii. 201.*

M. truncata, Lin. Branching, dichotomous, in loose tufts; branches smooth, truncated; pores operculated. 3 to 5 inches high. Inhabits Mediterranean sea.—*Lam. ii. 202.*

** *Polypiferous pores slightly or not apparent.*

M. informis, Lam. Irregular, glomerated, solid; ramuli thick, short, obtuse, subnodose.—*Ellis, Cor. pl. 27, fig. C.*

M. calcarea, Lam. Loosely branched, polychotomous, solid; branches slender, coalescing below; apex obtuse. Inhabits European seas.—*Ellis, Zooph. pl. 23, fig. 13.*

Gen. 35. *DISTICHOPORA*, Lam.—*Millepora*, Pall.

Stony, solid, fixed, branching, slightly compressed; pores unequal, marginal, disposed on the opposite sides in a longitudinal series, and in the form of sutures; stelliform warts on the surface of the branches.

D. violacea, Lam. Branched; ramuli ascending, flexuose, smooth and compressed. Inhabits Indian seas.—*Ellis, Zooph. 140.*

Gen. 36. *ORBULITES*, Lam.

Stony, free, orbicular, flat or slightly concave, porous on both sides or on the margin, and resembling a nummulite; pores very small, regularly disposed, approximated, sometimes scarcely apparent.

O. marginalis, Lam. Flat on both sides, the margin porose. Inhabits European seas on Corallines, Fuci, &c.—*Lam. ii. 196.*

The other species of this genus are fossil.

Gen. 37. *LUNULITES*, Lam.

Stony, free, orbicular, flattened, convex on one side, concave on the other; convex surface with radiated striae and pores between them; wrinkles or diverging furrows on the concave surface.

The species of this genus are only known in the fossil state.

Gen. 38. *OVULITES*, Lam.

Stony, free, ovuliform or cylindrical, hollow interiorly, often pierced at both ends; pores very small, regularly disposed on the surface.

Known only in the fossil state.

SECTION V.

Polypiferous masses sub-stony, with crustaceous or frondescant expansions; cells small, short or not deep, sometimes in a series, sometimes without order, and in general disposed at the surface of the expansions upon marine bodies.

The animals of this section form their crustaceous expansions on marine bodies. These expansions are simple, divided into lobes, or frondescant; but in all cases the cells are small, sessile, rarely diffuse, generally in a series, or disposed like net-work at the surface of the expansions, either on one of the faces or both. These cells are short, subtubular, straight or oblique, sometimes contiguous, and disposed in regular rows or diffuse, and in other cases isolated or separated. The terminal opening is orbicular or triangular, with the margin often dentated or ciliated, or sometimes shut by an opercular plate. The polypi, though aggregated, appear not to communicate together.

Gen. 39. DACTYLOPORA, Lam.

Stony, free, cylindrical, obtuse at one extremity, narrowed and pierced at the other; exterior surface reticulated, the meshes rhomboidal; pores very small.

D. cylindracea, Lam. (*Reteporite*, Bosc.)—*Lam.* ii. 189.

Gen. 40. OCELLARIA, Lam.

Stony, flattened as a membrane, variously bent, subinfundibuliform, with the superficies arenaceous, furnished with pores on both surfaces; pores disposed in quincunx order, with the centre elevated into a solid axis.

Two species of this genus have been found fossil in France.

Gen. 41. ALVEOLITES, Lam.

Stony, forming incrustations or a free mass, in numerous concentric beds covering one another; layers composed each of a junction of tubular prismatic cells, short, contiguous, and parallel, having the appearance of net-work at the exterior.

A. incrustans, Lam. Covering marine bodies, such as Madreporæ, Gorgoniæ, &c. the crust composed of a single layer of crowded tubes, and forming a net-work of unequal pentagonal or hexagonal meshes.—*Lam.* ii. 187.

The other species of this genus are fossil.

Gen. 42. RETEPORA, Lam.—*Millepora*, Lin.

Stony, porous interiorly, with thin, fragile, flattened expansions, composed of branches sometimes free, generally anastomosed like net-work; cells of the polypi on one side only, at the upper or internal surface of the mass.

R. reticulata, Lam. Flattened, ribbed, with irregular convolutions; internal surface warty and porous. Inhabits Mediterranean sea.—*Ellis, Zooph.* 138.

R. cellulosa, Lam. Flattened, submembranaceous, thin, reticulated, turbinated, waved, base subtubular; internal surface porous; expansions pierced with elliptic cells. Inhabits Indian seas.—*Ellis, Zooph.* pl. 26. fig. 2.

Gen. 43. ADEONA, Lam.

Almost stony, caulescent, frondescent or fan-shaped ; stem subarticulated, with the joints obscurely granulated, and with foliaceous expansions covered with cells on both sides ; cells very small, crowded in a series or in quincunx order, and the osculi round.

- A. *foliifera*, Lam. Stem subramose, leafy, the leaves lacinio-palmate, with the lobes oblong, subacute, unequal. Inhabits seas of New Holland.—*Lam.* ii. 179.

Gen. 44. ESCHARA, Lam.—*Millepora*, Lin.

Almost stony, not flexible, with flattened lamelliform expansions, thin, fragile, very porous interiorly, entire or divided ; cells of the polypi disposed in quincunx order on both sides.

The substance of the mass in this genus, though less of a stony hardness than the *Milleporæ*, are yet sufficiently distinct from the genus *Flustra*, the species of which are distinctly flexible, and have cells of a very different form. Pallas, however, comprehended them among the *Flustræ*.

- E. *foliacea*, Lam. Lamellar, conglomerated ; laminæ numerous, flexuose, and coalescing ; pores very small, rounded, and separate. Inhabits European seas.—*Ellis, Cor.* pl. 30, No. 3, fig. a, A, B, C.

- E. *cervicornis*, Lam. Much branched, subcompressed, branches narrow ; pores prominent, nearly tubular. Inhabits Mediterranean sea.—*Ellis, Zooph.* 134.

Gen. 45. CELLEPORA, Lam.—*Millepora*, Ellis.

Almost stony, porous interiorly, extended in a raised and leafy crust ; expansions flattened, lobed or branching, subconvolute, not flexible, celluliferous on the external surface ; cells urceolate, submembranous, gibbous, slightly projecting, contiguous, confused, with the mouth constricted.

The polypiferous crust in this genus is flexible when recent and in the water, but when dried is fragile. The *Celleporæ* incrust the different marine bodies upon which they are found ; but some form elevated leafy and sinuous expansions.

- C. *pumicosa*, Lam. Incrusting marine bodies, with the expansions convolute, tubular, or branching ; the external surface crowded with irregular, ventricose, and scabrous cells. Inhabits European seas.—*Ellis, Coral.* pl. 27, No. 4, fig. f, F.

- C. *spongites*, Lin. Base incrusting stones, &c. ; expansions tubular, turbinated, irregular, variously divided, and coalescent ; cells in a series, gibbous in the middle, the mouths suborbicular. Inhabits Mediterranean sea.—*Ellis, Zooph.* pl. 41, fig. 3.

Gen. 46. DISCOPORA, Lam.—*Cellepora*, Lin.

Subcrustaceous, flattened, extended in a waved, discoid, stony plate, with the upper surface cellular ; cells numerous, small, short, contiguous, regularly disposed in subquincunx rows, with the openings not constricted.

- D. *verrucosa*, Lam. Crustaceous, lamelliform, suborbicular, waved :

the cells obliquely quincunx, the openings slightly narrowed, and their margin before with a conical tooth, sometimes accompanied by two smaller ones. European and Indian seas.—*Lam.* ii. 166.

Gen. 47. TUBULIPORA, Lam.—*Cellepora*, Gmel.

Mass parasitical or incrusting, with submembranous cells in clusters or series, and in a great part free; cells elongated, tubular, with the opening orbicular, regular, rarely dentated.

T. transversa, Lam. With tubular cells, disposed in transverse rows, and united at their base; crust creeping on marine bodies. Inhabits Mediterranean sea.—*Ellis, Coral.* pl. 27, No. 3, fig. *e*, E.

T. orbiculus, Lam. Subincrusting fuci in an orbicular or convex form; cells tubular, straight, free, and distinct in their upper portion; mouths subdentated. Inhabits Mediterranean and Indian seas.—*Lam.* ii. 163.

Gen. 48. FLUSTRA.

Submembranous, flexible, stony, frondescent, or in a thin crust, formed of contiguous cells, disposed in numerous regular rows, either on one or both surfaces; cells sessile, short, oblique, with the opening terminal, irregular, often dentated or ciliated on the margin.

* *Expansions foliaceous, elevated, not incrusting.*

F. foliacea, Lin. Foliaceous, branching, with deep cut lobes, and cellular on both sides; lobes wedge-shaped, the apex rounded; margin of the cells with four or five short spines. Inhabits seas of Europe.—*Ellis, Coral.* pl. 29, No. 2, fig. *a*, A, B, C, E.

F. carbasea, Lam. Foliaceous, dichotomous, cespitose; the lobes linear, wedge-shaped, obtuse; cells disposed in one stratum, oblong-oval, with the openings small. Inhabits coasts of Scotland.—*Ellis, Zooph.* pl. 3, fig. 6, 7.—*Plate 8, fig. 13.*

** *Expansions incrusting, or enveloping, rarely free.*

F. telacea, Lam. Incrusting ulvæ and large-leaved fuci, in the form of a thin web, resembling a fine net-work, with oblong quadrangular meshes; mouth of the cells subnaked. Inhabits European seas.—*Lam.* ii. 158.

F. dentata, Lam. Incrusting, sometimes subfrondescent, shining, and stony; mouth of the cells elliptic, multidentate. Seas of Europe, on the stems of fuci.—*Ellis, Coral.* pl. 29, fig. D, D, I. Fossil species of this genus have been found on remains of shells and crustacea.

SECTION VI.

Polypiferous masses of one substance only, with slender fistulous, membranous, or horny stems, flexible and branching, containing polypi in their interior.

The polypi of this section form elongated, flexible, slender, branched, and transparent stems, resembling delicate plants. The stems and branches are fistulous, inorganic, of a horny substance, and contain the polypi, which are attached to the common body by their posterior extremity. The cells are terminal or lateral, project-

ing outwards along the stem and branches of the polypiferous growth; and the common body continues to increase at the superior extremity, while the lower is progressively dried up. Lamarck divides the animals of this section into those which have the cells lateral and those in which they are terminal.

1. *Cells lateral.*

Gen. 49. POLYPHYSA, Lam.

Polypiferous mass fungoid, with a calcareous crust, and a simple, filiform, fistulous stem, terminated by a cluster of inflated cells; cells vesicular, unequal, clustered at the top.

P. Australis, Lam. With numerous, erect, bundled stems; head unequal, terminal. Inhabits seas of New Holland.—*Lam.* ii. 152.

Gen. 50. ACETABULUM, Lam.

Fungoid, with a calcareous crust; stem filiform, simple, fistulous, terminated by an orbicular flattening, hollow in the centre; head with radiated striæ from above downwards, perforated in the margin, and composed of tubes united orbicularly.

A. Mediterraneum, Lam. (*Tubularia acetabulum*, Gmel.) Crust of the margin regular; stems erect. Inhabits Mediterranean sea, on stones, &c.—*Lam.* ii. 150.

Gen. 51. TIBIANA, Lam.

Fixed, tubular, membranous or horny, slightly incrustated exteriorly, perforated on the sides, with the openings alternate, large, and slightly projecting.

T. ramosa, Lam. Tubes membranous, subflexuose, upper branches white; cells prominent, inflated. Inhabits seas of New Holland.—*Lam.* ii. 149.

Gen. 52. DICHOTOMARIA, Lam.

Polypiferous mass with tubular, subarticulate, dichotomous stems, and a calcareous incrustation; cells of the polypi not apparent.

* *Tubular, subarticulated.*

D. fragilis, Lam. Branching, dichotomous, in tufts, white or whitish green; joints cylindrical, the apex of the last subcompressed. Inhabits American seas.—*Lam.* ii. 145.

D. obtusata, Lam. (*Corallina*, Ellis.) Branching, corymbose, dichotomous, jointed; joints oblong-ovate, subvesiculose, compressed when dry. Inhabits coasts of the Bahama Islands.—*Ellis, Zooph.* pl. 22, fig. 2.

** *Not articulated.*

D. fruticulosa, Lam. (*Corallina*, Ellis.) Branching, corymbose: branches round, rigid, the last short and subacute. Inhabits American seas.—*Ellis, Zooph.* pl. 22, fig. 5.

The inarticulated species have been deemed by some botanists to belong to the vegetable kingdom, and have been named *Fucus lichenoides*.

Gen. 53. ANGUINARIA, Lam.

In the form of a plant, climbing, slender, and fistulous; cells straight, filiform, tubular, distant, slightly clavate or spatulose, with the openings placed laterally below the summit.

A. spatulata, Lam. (*Sertularia Anguina*, Lin.) Inhabits seas of Europe.—*Ellis*, *Cor.* pl. 22, No. 11, fig. c, C, D.

Gen. 54. CELLARIA, Lam.

With tubular branched stems, subarticulated, horny, shining, calcareous; cells in rows, either concatenated, or adnate, or incrustated at the surface.

C. salicornia, Lam. (*C. farciminoides*, Soland.) Dichotomous; articulated; joints cylindrical; cells rhomboidal. Inhabits European ocean.—*Ellis*, *Cor.* pl. 23, No. 1, fig. a, A.

C. thuia, Lam. (*Sertularia*, Ellis.) Stem rigid, flexuose, paniculated above; branches dichotomous; cells compressed, wide at the base. Inhabits seas of Europe, on oyster beds, common.—*Ellis*, *Cor.* pl. 5, No. 9, fig. b, B.

C. reptans, Lam. (*Sertularia*, Ellis.) Creeping, dichotomous, articulated; cells alternate, unilateral; osculi with short spinous processes at the top. Inhabits seas of Europe.—*Ellis*, *Coral.* pl. 20, No. 3, fig. b, B.

Gen. 55. LIRIOZOA, Lam.—*Cellaria*, Ellis.

Branched, calcareous; stems tubular, jointed, creeping; cells oblong, pedicellate, in clusters of three, with opposite clusters at the top of the joints.

L. Caribæa, Lam. (*Cellaria tulipifera*, Ellis.) Calcareous, subdiaphanous, clavate; cells in opposite clusters, and terminal. Inhabits West Indian seas.—*Ellis*, *Zcoph.* pl. 5, fig. a, A.

Gen. 56. SERIALARIA, Lam.—*Sertularia*, Lin.

Branched, horny, with slender fistulous stems, furnished with cylindrical projecting cells, parallel, cohering in series, in masses, or in a continuous spiral form.

* *Cells cohering in separate masses.*

S. lendigera, Lam. Much branched, diffuse; branches filiform, jointed, subdichotomous; cells in distinct rows. Inhabits seas of Europe.—*Ellis*, *Coral.* pl. 15, No. 24, fig. b, B.

** *Cells cohering in continuous spiral masses.*

S. convoluta, Lam. Stem alternately branched; branches simple, filiform; cells cohering in a continuous spire, surrounding the branches. Inhabits seas of New Holland.—*Lam.* ii. 131.

Gen. 57. PLUMULARIA, Lam.—*Sertularia*, Lin.

Horny, branched, with slender fistulous simple or branched stalks, furnished with calyciferous ramuli; cells prominent, sessile, dentiform, subaxillary; vesicles subpedunculate.

The Plumulariæ are known at first sight by their branches being disposed in general like the webs of a feather.

P. myriophyllum, Lam. Stem slightly divided, pinnated ; pinnulae alternate, long, curved, crowded ; cells truncated, supported at the base by an obsolete spinous process. Inhabits European seas.—*Ellis, Cor. pl. 8.*

P. setacea, Lam. Simple, pinnated ; pinnæ alternate, subincurved ; cells minute, distant, denticulated. 3 inches long. Inhabits European seas.—*Ellis, Zooph. 47.*

P. cristata, Lam. (*S. pluma*, Lin.) Loosely branched, subdichotomous ; pinnæ of the branches straight ; cells companulate, sessile ; vesicles crested. Inhabits European seas.—*Ellis, Cor. pl. 7, No. 12, fig. b, B.*

Gen. 58. ANTENNULARIA, Lam.—*Sertularia*, Ellis.

Horny, with fistulous stems, simple or branched, articulated, and furnished with verticillate, slender ramuli ; cells distant.

A. ramosa, Lam. (*S. antennina*, Ellis.) Stem erect, simple, or alternately branched ; branches of the whorls slender, incurved ; cells distant, unequal, slightly campanulate ; vesicles pedunculated, ovate. Inhabits European seas, on oyster beds.—*Ellis, Cor. pl. 9, No. 14, b.*

Gen. 59. SERTULARIA, Lin.

Horny, with slender fistulous stems, simple or branched, and furnished, as well as the branches, with separate and lateral dentiform cells ; cells projecting, sessile, or subpediculated, scattered, or disposed in two opposite rows ; vesicles larger than the cells.

The polypi of this genus appear in the form of small plants deprived of leaves, or of which the leaves are extremely small. The stems are in general transparent and very slender, and the greater portion finely branched. They appear as if dentated longitudinally by the projecting, separate, and lateral cells. These cells are small, numerous, sometimes opposite and sometimes alternate. They vary in their form according to the species. The Sertulariæ are found adhering to rocks, fuci, shells, and other marine bodies.

* *Cells subpedicellate.*

S. lava, Lam. Alternately branched ; branches simple ; cells alternate, remote, pedicellate.—*Lam. ii. 116.*

** *Cells sessile.*

S. abietina, Lin. Alternately and bifariously pinnated ; cells subcylindrical ; vesicles oval, with a narrow base, and a contracted tubular summit. About a foot long. Inhabits European seas. B.—*Ellis, Cor. pl. 1, No. 2, fig. b, B.*

S. cupressina, Lin. Branches compound, elongated ; ramuli alternately divided ; cells subcylindrical, obliquely truncated ; vesicles subovate, with a subtubular orifice. Inhabits European seas. B.—*Ellis, Cor. pl. 3, No. 5, fig. a, A.—Plate 8, fig. 12.*

S. pumila, Lin. Branches irregular, numerous, and bifarious ; cells

opposite, recurved, subcylindrical; vesicles ovate. About an inch long. European seas, on fuci.—*Ellis, Cor. pl. 5, No. 8, fig. a, A.*
—*Plate 8, fig. 14.*

2. *Cells terminal.*

Gen. 60. CAMPANULARIA, Lam.—*Sertularia*, Lin.

Stems fistulous, filiform, horny, simple, or branched; cells campanulate, dentated on the margin, supported by long and twisted footstalks.

C. verticillata, Lam. Stem alternately branched; branches and summit verticillate, with terminal cells. Inhabits European seas.—*Ellis, Cor. pl. 13, No. 20, fig. a, A.*

C. dichotoma, Lin. Stem filiform, long, branched, subdichotomous; cells bell-shaped, terminal; vesicles clavate, axillary. European seas.—*Ellis, Cor. pl. 12, No. 18, fig. a, A, c, C.*

Gen. 61. CORNULARIA, Lam.

Fixed by the base, horny, with simple infundibuliform stems, each containing a polypus; polypus solitary, terminal, the mouth with eight tentacular pinnæ in one row.

C. rugosa, Lam. (*Tubularia cornucopiæ*, Pall.) Inhabits Mediterranean sea.—*Lam. ii. 112.*

Gen. 62. TUBULARIA, Lam.

Polypiferous mass fixed by its base, slender, tubular, simple or branched, and horny, the extremities of the stem and branches terminated each by a polypus; mouth of the polypi with two rows of naked tentacula, not retractile, and with a varix at their origin.

The *Tubulariæ* are distinguished from other genera resembling them in general appearance, by their numerous tentacula disposed in two rows not being capable of retraction into the tube, and by having at their origin a sort of collar.

T. ramosa, Lam. Tubular, branched, the axillæ of the branches twisted. Inhabits British seas.—*Ellis, Cor. pl. 16, fig. a, pl. 17, fig. a, A.*—*Plate 8, fig. 15.*

Gen. 63. PLUMATELLA, Lam.

Fixed by the base, slender, tubular, branching, submembranous, with the extremities of the stems and branches terminated each by a polypus; mouths retractile, furnished with ciliated tentacula disposed in a single row, and destitute of a varix at their origin.

The polypi of this genus inhabit fresh waters.

P. cristata, Lam. Stem short, branched, subpalmated; tentacula in a campanulated or lunated series. Inhabits ponds in Europe.—*Lam. ii. 107.*

P. repens, Lam. (*Tubularia*, Gmel.) Stem branching, filiform, creeping; tentacula subfasciculate, with verticillate ciliæ; vesicles

cles elongated. Inhabits fresh waters, under the leaves of aquatic plants.—*Lam.* ii. 108.

SECTION VII.

Polypiferous masses either free, isolated, and floating in the water, or fixed and agglomerated in cellular masses composed of one substance on aquatic bodies; polypi with numerous tentacula, but not completing the circle round the mouth.

The polypi of this section inhabit fresh and chiefly running waters.

1. *Fixed upon other bodies.*

Gen. 64. *ALCYONELLA*, Lam.

Polypiferous mass incrusting, thick, convex and irregular, composed of an aggregation of vertical subpentangular tubes, open at their summit; polypi elongated, cylindrical, with fifteen or twenty straight tentacula disposed around the mouth on one side at their upper extremity.

A. stagnorum, Lam. (*Alcyonium fluviatile*, Brug.) Polypi forming a mass of crowded irregular tubes, with a cylindrical cavity, obscurely pentagonal at the opening. Ponds and springs.—*Lam.* ii. 102.

Gen. 65. *SPONGILLA*, Lam.

Mass fixed, polymorphous, irregular, cellular, composed of membranous subpiliferous laminae, forming unequal, diffuse cells, without order; gelatinous and free granules in the cells.

S. friabilis, Lam. Sessile, convex, obsoletely lobulated, fibrous within; fibres longitudinal, branched. Inhabits ponds in Europe.—*Lam.* ii. 100.

S. ramosa, Lam. Sessile, branched; branches elongated, roundish, unequal, lobulated. Europe in ponds and lakes.—*Lam.* ii. 100.

2. *Free and floating in the water.*

Gen. 66. *CRISTATELLA*, Lam.

Globular, gelatinous, free, with the surface covered by short thick polypiferous tubercles; summit of each tubercle inclosing a polypus, of which the extremity is divided into two retractile branches, arched and furnished with pectinated tentacula; mouth placed at the union of the tentacular branches.

C. vagans, Roesel. Stagnant or running waters.—*Lam.* ii. 97.

Gen. 67. *DIFFLUGIA*, Lam.

Body very small, gelatinous, contractile, inclosed in a testaceous tube; anterior part projecting beyond the tube, and extending irregularly from one to ten tentacular arms; sheath oval or subspiral, truncated and open at the base, agglutinating grains of sand at its external surface.

D. protæiformis, Lam. Europe on aquatic plants.—*Lam.* ii. 95.

ORDER IV.—POLYPI DENUDATI.

Tentaculated polypi, not forming a polypiferous mass ; much diversified in the form, the number, and situation of their tentacula, and fixed either constantly or spontaneously.

The genus *Zoantha* of Lamarck is placed by Cuvier in his class *Acalepha*.

Gen. 1. PEDICELLARIA, Lam.

Body fixed, formed of a stiff peduncle, terminated at the summit by a club-shaped inflation ; club furnished with scales or radiated beards ; mouth terminal.

P. globifera, Lam. Head spherical ; peduncle long, naked. Found on Echini in the Northern seas.—*Lam.* ii. 64.

Gen. 2. CORYNE, Lam.—*Hydra*, Muller.

Body fleshy, pedunculated, terminated at the summit by an inflation like a vesicular club ; club furnished with scattered tentacula ; mouth terminal.

The polypi of this genus are often compound, and are found fixed on fuci and other marine bodies.

C. squamata, Lam. Peduncle simple ; club ovate-oblong ; base gemmiferous ; tentacula setaceous. Northern ocean.—*Lam.* ii. 62.

C. setifera, Bosc. Club oblong, sessile ; tentacula setaceous, erect. Found on *Fucus natans*.—*Lam.* ii. 62.

Gen. 3. HYDRA, Lam.

Body oblong, linear, or like a reversed cone, narrowed inferiorly, gelatinous and transparent, and fixed spontaneously by the base ; mouth terminal, with a row of cirrous tentacula.

Of all the polypi, the *Hydræ* have been most the subject of observation. They are generally known by the name of Fresh Water Polypi or Polypi with arms. The experiments made upon them by Trembley proved that at least, in one instance, animals may be multiplied without the necessity of ova, or that the regenerative faculty resides in every portion of their body. The body of the *Hydræ* is gelatinous, diaphanous, linear, or like a reversed cone. It is fixed spontaneously by its narrowed base upon different bodies, and at its anterior extremity is a hollowed mouth surrounded by from six to twelve filiform or setaceous cirrous tentacula, sometimes very long. The species is multiplied by gemmæ or buds, which spring up laterally on the body, and which separate sooner or later to form new animals, according to the season. Experiment has ascertained that if an *Hydra* be deprived of any part of its body it is readily reproduced ; if cut in two each portion becomes a complete animal ; and if separated into smaller parts each will form in two days a separate individual. Trembley even turned one of these animals inside out as the finger of a glove may be turned, without its ceasing to live and perform its animal functions.

H. viridis, Lam. Body green, transparent, short, with from eight to ten tentacula about the length of the body. Fresh waters, on the leaves of aquatic plants. About an inch high.—*Lam.* ii. 60.

H. grisea, Lam. Body grayish ; tentacula varying in number. Inhabits fresh waters.—*Lam.* ii. 60.

H. lutea, Lam. Yellowish, branched, head large, with about ten tentacula. Inhabits the sea, on Fuci.—*Lam.* ii. 60.

ORDER V.—POLYPI CILIATI.

Mouth furnished with ciliated and gyratory organs, which agitate the water, but which do not seize the food.

The Ciliated Polypi are so small that Muller places them in a division of the Infusory animals; but, from having a distinct mouth, Lamarck arranges them as the lowest order of the class Polypi, approximating them in the descending or ascending series to these minute animals. Lamarck besides remarks, that they are higher in organization than the *Infusoria*, properly so called, from having a distinct and terminal mouth; by moving cirri or ciliated and rotatory organs accompanying this mouth; by the analogy of their general form; and by their forming in some cases, as the greater part of the Vorticellæ, compound animals. The ciliated polypi live in fresh and stagnant waters, or in sea water mixed with that of rivers; and many of them possess the faculty of retaining vitality though dried for years, and of recovering when placed again in water. Lamarck divides the Ciliated Polypi into two sections, the Rotatory and the Vibratile.

SECTION I. ROTIFERI.

With one or many organs in a circular form, ciliated and rotatory, at the opening of the mouth.

The Rotiferi are so called from many of them having at the opening of the mouth a pair of dentated wheels which they turn rapidly. These wheels are said to be composed of a plicated circular cord which by its undulations forms a number of projecting and sharp angles, resembling ciliform teeth. The mouth in the polypi of this section is large, campanulate or infundibuliform, and very contractile.

Gen. 1. TUBICOLARIA, Lam.

Body contractile, oblong, contained in a tube fixed on aquatic bodies; mouth terminal, infundibuliform, furnished with a retractile, ciliated, and rotatory organ.

T. quadriloba, Lam. Tube reddish; rotatory organ quadrilobed; lobes unequal. Inhabits fresh waters on the roots of *Ranunculus aquatilis*.—*Lam. ii. 53.*

T. alba, Lam. Tube white; rotatory organs inclined laterally, sub-sinuuous. Inhabits fresh waters.—*Lam. ii. 53.*

Gen. 2. VORTICELLA, Lam.

Body naked, pedunculated, contractile, fixed spontaneously or constantly by its base, and with the superior extremity inflated and terminated by a large mouth furnished with rotatory ciliæ.

The Vorticellæ resemble the Hydræ; but in place of having tentacula round their mouth disposed in rays, and moving slowly, they have ciliæ, or two tufts opposed, which have a rotatory oscillation, executed with surprising quickness. They are very minute, and found in stagnant and slow running waters on the stems of aquatic plants. They multiply by natural splittings or sections, of which each forms a new animal. Lamarck divides the genus into Simple Vorticellæ, or those which are fixed spontaneously or temporarily; and Compound Vorticellæ, where the peduncle is branched and constantly fixed.

* *Simple.*

V. stentorea, Lam. Elongated, tubiform, with a tail; anterior limb ciliated. Inhabits stagnant waters.—*Lam. ii. 47.*

V. socialis, Lam. Aggregated, tailed, club-shaped, with the disc oblique. Inhabits marshes.—*Lam.* ii. 48.

V. fasciculata, Lam. Simple, green, campanulate ; margin reflected ; peduncle twisted. Inhabits rivers on Confervæ.—*Lam.* ii. 50.

** *Compound.*

V. pyrraria, Lam. Compound, inversely conical, peduncle branched. Inhabits marshes, on the stalks of aquatic plants.—*Mull. Inf.* pl. 46, fig. 1-4.

V. ovifera, Lam. Compound, inversely conical, truncated ; peduncle rigid, branched, fistulose ; ramuli oviferous, conglomerate.—*Lam.* ii. 50.

Gen. 3. URCEOLARIA, Lam.

Body free, contractile, urceolate, sometimes elongated, without tail or peduncle ; mouth terminal, dilated, furnished with rotatory ciliæ.

The microscopic animals of this genus swim freely in the water and with much celerity, rarely fixing themselves by their posterior extremity. They withdraw or protrude the ciliated and rotatory organs at their anterior extremity at will, and move them with great quickness.

U. viridis, Lam. Cylindrical, uniform, opaque green. Inhabits pure waters.—*Lam.* ii. 41.

U. lunifera, Lam. Green, lunate, the middle of the margin behind mucronate. Inhabits sea water.—*Lam.* ii. 41.

U. sacculus, Lam. Cylindrical ; aperture patulous ; margin reflected. Inhabits marshes.—*Lam.* ii. 43.

Gen. 4. FURCULARIA, Lam.

Body free, contractile, oblong, furnished with a short or elongated tail terminated by two points or two setæ ; mouth provided with one or two ciliated and rotatory organs.

F. larva, Lam. Cylindrical ; aperture lunated, and two caudal spines. Inhabits sea water.—*Lam.* ii. 37.

F. rediviva, Lam. (*Vorticella rotatoria*, Mull.) Cylindrical ; tail long. Inhabits pools of fresh water occasionally dry.—*Lam.* ii. 39.

This is the species upon which Spallanzani made his experiments.

Gen. 5. BRACHIONUS, Lam.

Body free, contractile, almost oval, covered, at least partly, by a transparent sheath, stiff and capsular, and furnished anteriorly with one or two ciliated and rotatory organs.

The animals of this genus are very varied in point of form, which they change by contraction. Some are deprived of a tail, but the greater portion have a simple forked tail as the Furculariæ. They live in the sea and fresh waters. The sheath or shell, as it has been termed, is univalve or bivalve and capsular, according to the species.

* *No tail.*

B. striatus, Lam. Sheath or shell univalve, ovate, striated ; apex with six teeth ; base entire, without tail. Sea water.—*Lam.* ii. 34.

B. squamula, Lam. Shell univalve, orbicular ; apex truncated, four-toothed, base entire.—*Lam.* ii. 34.

** *Tail simple and naked.*

B. passus, Lam. Capsular shell cylindrical, the fore part with two pendulous cirri, and one caudal seta. Inhabits salt marshes.—*Lam.* ii. 35.

*** *Tail terminated in two points or setæ.*

B. lamellaris, Lam. Univalve ; shell produced ; apex entire ; base three-horned ; tail with two hairs. Inhabits marshes.—*Lam.* ii. 35.

B. ovalis, Lam. Bivalve ; shell depressed ; apex emarginate, base cleft ; tail with double cirrus. Inhabits marshes among *Confer-væ*.—*Lam.* ii. 36.

Gen. 6. FOLLICULINA, Lam.

Body contractile, oblong, inclosed in a transparent sheath ; mouth terminal, large, with ciliated and rotatory organs.

F. ampulla, Lam. (*Vorticella*, Mull.) Follicle swelling, pellucid ; head bilobed. Inhabits sea water.—*Lam.* ii. 30.

SECTION II.—VIBRATILES.

Ciliæ near the mouth moving in interrupted vibrations.

The minute animals which form this section are the most imperfect of the polypi, and seem to lead to the appendiculated Infusoria. They are chiefly distinguished from these by their having a mouth. They are gelatinous and transparent.

Gen. 7. VAGINICOLA, Lam.—*Trichoda*, Mull.

Body very small, oval or oblong, ciliated anteriorly, furnished with a tail, and inclosed in a transverse sheath, not fixed.

V. inquilina, Lam. Follicle cylindrical, hyaline ; a twisted pedicle beyond the follicle. Inhabits sea water.—*Lam.* ii. 27.

V. innata, Lam. Follicle cylindrical ; tail exserted beyond the follicle. Inhabits sea water.—*Lam.* ii. 27.

Gen. 8. TRICHOCERCA, Lam.

Body very small, oval or oblong, truncated anteriorly ; mouth retractile, subciliated, tail forked, sometimes articulated.

* *Tail not articulated.*

T. vermicularis, Lam. Cylindrical, annulated, with an exsertile proboscis ; spines of the tail double. Inhabits rivulets.—*Lam.* ii. 25.

** *Tail long, articulated.*

T. longicauda, Lam. Cylindrical, truncated and crinited before ; tail long, biarticulated, with two setæ. Marshes.—*Lam.* ii. 26.

Gen. 9. RATTULUS, Lam.

Body very small, oblong, truncated or obtuse anteriorly ; mouth distinct ; tail very simple.

R. carinatus, Lam. Oblong, carinated, crinited before ; tail setiform, very long. Inhabits water of ditches.—*Lam.* ii. 24.

CLASS XIV.—INFUSORIA.

Microscopic animals, gelatinous, transparent, polymorphous, and contractile ; no distinct mouth, nor constant or determinable interior organ ; generation fissiparous or gemmiparous.

THE Infusory Animals, or those animalcules which have been observed in infusions of different plants, or in waters more or less corrupted, and which are generally so minute as to require the aid of the microscope to discover them, form the last series of beings in the animal scale. The greater portion of these appear to have a gelatinous body of extreme simplicity ; but systematical writers have also arranged in this class many animals much more complicated in appearance, and which resemble them only in their extreme minuteness.

Of animals so minute, the organization is but imperfectly known. Destitute of a distinct mouth and internal organ of digestion, they seem to receive nourishment by absorption in all parts of their body. They are, however, capable of contraction and voluntary motion ; and their reproduction is effected by a separation of parts.

Lewenhoeck and Muller first introduced these animalcules to the notice of naturalists under the name of *Infusoria*. In Lamarck's system they compose the first class of his Invertebral animals ; Dumeril arranges them as the fourth family of his Zoophytes ; and Cuvier makes them the fifth class of Zoophytes, or those animals which he has arranged as the fourth great division of the Animal Kingdom. Lamarck divides the Infusoria into two orders :

I. INFUSORIA APPENDICULATA. With projecting parts at their exterior, as hairs, horns, or a tail.

II. INFUSORIA NUDA, or Naked Infusoria. Destitute of exterior appendages.

ORDER I.—INFUSORIA APPENDICULATA.

With projecting parts at the exterior of the body, as hairs, a kind of horns, or a tail.

The animals of this order are very minute, gelatinous, transparent, and of various forms.

Gen. 1. FURCOCERCA, Lam.—*Cercaria*, Muller.

Body very small, transparent, rarely ciliated, furnished with a diphyllous or bicuspid tail.

F. podura, Lam. Cylindrical, acuminated behind; tail subcleft. Inhabits marshes.—*Lam.* i. 447.

F. crumena, Lam. Cylindrical, ventricose; fore part obliquely truncated, and with a linear bicuspid tail. Found in infusion of ulvæ.—*Lam.* i. 448.

Gen. 2. CERCARIA, Lam.

Body very small, transparent, diversiform, with a simple tail.

C. gyrinus, Lam. Body rounded; tail acuminated. Found in animal infusions.—*Lam.* i. 445.

C. cyclidium, Lam. Oval, subemarginate behind; tail exsertile. Inhabits pure waters.—*Lam.* i. 446.

Gen. 3. KERONA, Lam. Mull.

Body very small, diversiform, without particular tail, furnished with scattered cirri or stiff hairs on some part of its surface.

K. rostellum, Lam. Orbicular, membranaceous, one side angular, the other with a series of triple horns. Inhabits river and sea water.—*Lam.* i. 442.

K. histrio, Lam. Ovate-oblong, the fore part with black punctiform horns, behind with longitudinal pinnules. Inhabits rivers, among Confervæ.—*Lam.* i. 443.

Gen. 4. TRICHODA, Lam.

Body very small, transparent, diversiform, destitute of particular tail, and furnished with soft hairs over the whole or a part of the surface.

* *Body with hairs over all the surface.*

T. mamilla, Lam. Body spherical, opaque, with an exsertile papilla. Inhabits marshes.—*Lam.* i. 435.

T. viridescens, Lam. Cylindrical, opaque; thickest behind. Inhabits sea water.—*Lam.* i. 435.

** *Body hairy on some part of its surface.*

T. grandinella, Lam. Spherical, pellucid, crenated above. Found in pure waters and in vegetable infusions.

T. horrida, Lam. Subconical, broadish before, obtuse behind, with deflexed setæ. Found in the water of the mussel.—*Lam.* i. 439.

ORDER II.—INFUSORIA NUDA.

Body very simple, microscopical, destitute of organs or exterior appendages, and appearing homogeneous.

The naked Infusoria are animalcules of very simple organization, the greater part of them transparent and extremely minute, appearing even with the assistance of the microscope but as moving points. They are always found in water which has been for some time exposed to the heat of the air or sun, and above all in water in which animal or vegetable matters have been infused. Lamarck divides them into two sections, as the body seems consistent, or merely membranous.

SECTION I.

Body membranous, almost without thickness, flattened or concave.

Gen. 1. BURSARIA, Lam.

Body very simple, membranous, concave.

B. truncatella, Lam. Follicular, with the apex truncated. Found in the water of ditches.—*Mull. Inf.* pl. 17, fig. 1-4.

B. hirundinella, Lam. Lacinate on both sides, the extremities produced. Inhabits water of marshes.—*Mull. Inf.* pl. 17, fig. 9-12.

Gen. 2. KOLPODA, Lam.

Body very minute, very simple, flattened, oblong, sinuous, irregular, transparent.

K. lamella, Lam. Elongated, membranaceous, curved before.—*Mull. Inf.* pl. 13, fig. 1, 5.

K. gallinula, Lam. Oblong, the fore part of the back hyaline. In sea water which has been kept.—*Mull. Inf.* pl. 13, fig. 6.

K. striata, Lam. Oblong, subarcuate, depressed, white, acuminate before, and rounded behind. In sea water.—*Mull. Inf.* pl. 13, fig. 16, 17.

Gen. 3. PARAMECIUM, Lam.

Body very small, simple, transparent, membranous, oblong.

The animalcules of this genus are less sinuous, angular, and irregular than the preceding.

P. aurelia, Lam. Compressed, acute behind. Inhabits ditches where the *Lemna* grows.—*Mull. Inf.* pl. 12, fig. 1, 14.

P. chrysalis, Lam. Cylindrical, plicated towards the fore part, obtuse behind. Found in sea water in autumn.—*Mull. Inf.* pl. 12, fig. 15.

Gen. 4. CYCLIDIUM, Lam.

Body very minute, simple, transparent, flattened, orbicular, or oval.

C. bulla, Lam. Orbicular, hyaline. Found in infusion of hay.—*Mull.* pl. 11, fig. 1.

C. rostratum, Lam. Oval, pellucid, subacute behind. In vegetable infusions.—*Mull.* pl. 11, fig. 11, 12.

Gen. 5. GONIUM, Lam.

Body very minute, simple, flattened, short and angular.

G. pectorale, Lam. Quadrangular, pellucid, of sixteen globules. Inhabits pure waters.—*Mull.* pl. 16, fig. 9.

G. pulvinatum, Lam. Quadrangular, opaque, twisted. In the water of dunghills.—*Mull.* pl. 16, fig. 12, 15.

SECTION II.

Body of perceptible thickness.

Gen. 6. VIBRIO, Lam.

Body very minute, simple, cylindrical and prolonged.

The *Vibrio aceti*, or the vinegar eel, as it is called, has, it is said, a mouth furnished with two lips and an alimentary canal, and if this be the case it belongs to the class of worms.

V. lineola, Lam. Linear, very minute. In vegetable infusions; one of the most minute of animals.—*Mull. Inf.* pl. 6, fig. 1.

V. vermiculus, Lam. Cylindrical, gelatinous, tortuous. Inhabits water of marshes.—*Mull. Inf.* pl. 6, fig. 10, 11.

V. bipunctatus, Lam. Linear, equal, truncated at the extremities, with two points in the middle. Found in long kept sea water.—*Mull. Inf.* pl. 7, fig. 1.

Gen. 7. ENCHELIS, Lam.

Body very minute, simple, oblong, cylindrical, but the form variable.

E. viridis, Lam. Subcylindrical, obliquely truncated before. In water old kept.—*Mull. Inf.* pl. 4, fig. 1.

Gen. 8. PROTEUS, Lam.

Body very minute, simple, transparent, of changeable form, diversely lobed instantaneously.

P. diffluens, Lam. Body diverging into branches instantaneously. Found in the water of marshes.—*Mull. Inf.* pl. 2, fig. 1, 12.

Gen. 9. VOLVOX, Lam.

Body very minute, simple transparent, spherical or ovoid, turning upon itself as upon an axis.

These animalcules whirl round upon themselves with greater or less quickness. In many the body is composed of moving globules united in a common mass.

V. globulus, Lam. Globose, subobscure behind.—*Mull. Inf.* pl. 3, fig. 4.

V. socialis, Lam. Spherical, the crystalline molecules at equal distances. Inhabits waters of rivers.—*Mull. Inf.* pl. 3, fig. 8, 9.

V. globator, Lam. Spherical, membranous, with scattered globules.

In stagnant waters, and discoverable by the naked eye.—*Mull. Inf.* pl. 3. fig. 12, 13.

Gen. 10. MONAS, Lam.

Body extremely minute, simple, transparent, in the form of a point.

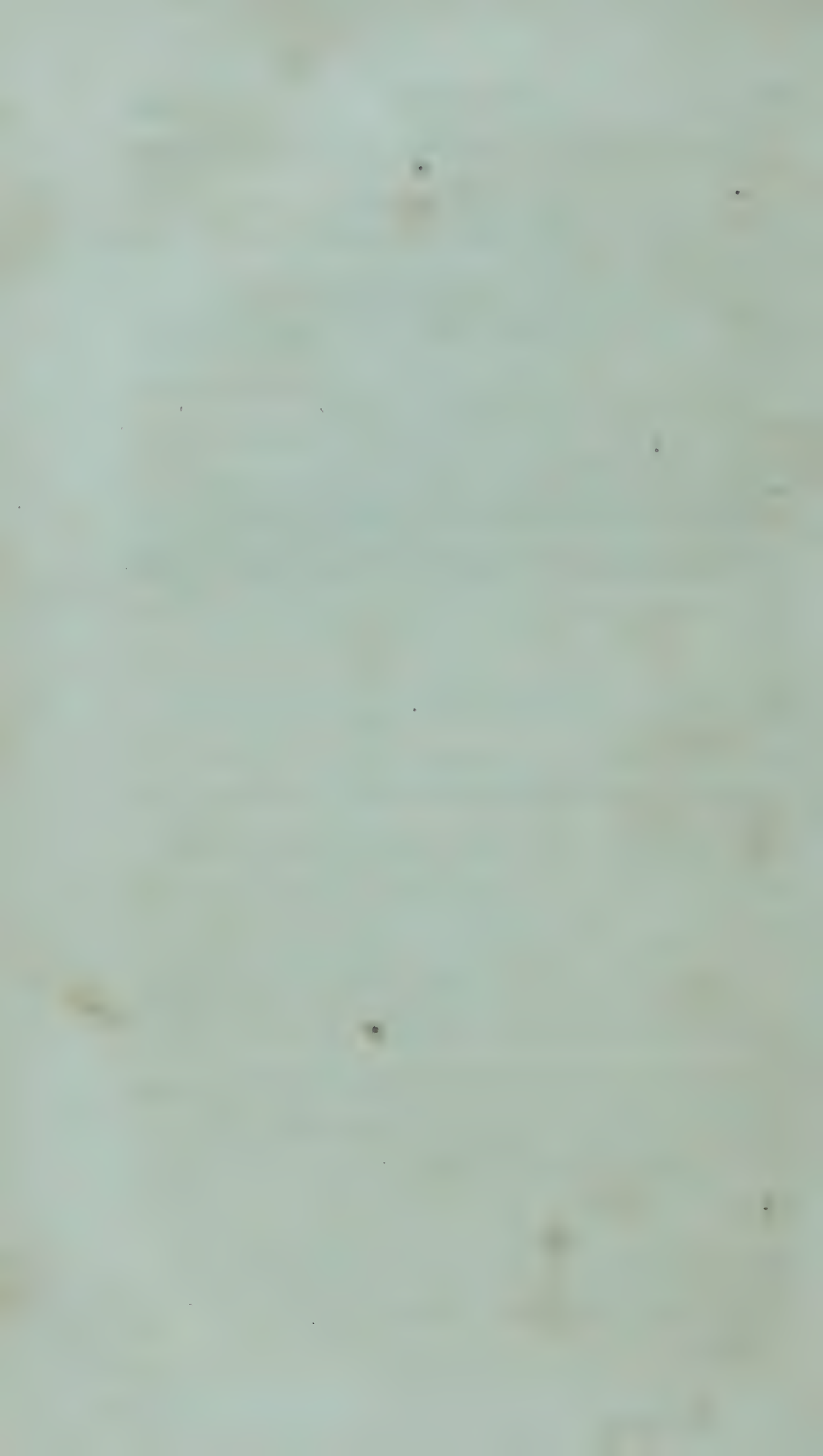
The Monads are the most minute and the most simple of all known animals; and their animal nature is only inferred from possessing the power of locomotion. They are found in stagnant waters, or water impregnated with vegetable matter, when the weather is warm.

M. pulvisculus, Lam. Hyaline, with the margin greenish. In the water of marshes.—*Mull. Inf.* pl. 1. fig. 5, 6.

M. punctum, Lam. Black, subcylindrical. Found in infusion of the pulp of the pear.—*Mull. Inf.* pl. 1. fig. 4.

M. termo, Lam. Gelatinous; body extremely minute. Found in vegetable and animal infusions.—*Mull. Inf.* pl. 1, fig. 1.

Perhaps the smallest of animated beings. The figure of Muller, representing a drop of water magnified, seems to contain an incalculable number of these minute beings.



THE VEGETABLE KINGDOM.

THE Second great Division of organized bodies comprehends the Vegetable Kingdom, distinguished from the preceding division by its passive character, by the want of voluntary motion, and of sensation. The alimentary matters necessary for the support of animal life are introduced into an internal cavity, while in vegetables the nourishment is entirely drawn from their surface. The food of the one is of various consistence or solid ; that of the other is confined to the absorption of liquids or gases. The branch of science which treats of the characters, phenomena, and mode of classifying the Vegetable Kingdom is termed BOTANY, from *Βοτάνη*, an herb.

Vegetables, like animals, possess a principle of vitality, though in a lower degree. Plants originate from seeds, as animals from ova, and like them increase, reproduce, and die. The parts of vegetables consist, 1. of roots, stems, branches, and leaves ; and, 2. the organs of fructification, though these last undergo great and singular modifications among the more imperfect plants. The first are necessary to individual existence ; the second to reproduction.

Three principal tissues are recognized in the vegetable kingdom : 1. The *medullary*, or cellular and parenchymatous ; 2. the *vascular* ; and, 3. the *fibrous*. The cellular tissue composes the chief portion of the more imperfect vegetables, of which some are of the consistence of jelly ; the *Ulvæ* are gelatinous ; the *Lichens* and *Algæ* are foliaceous expansions of cellular tissue, or in which this tissue is extended into tubes ; the *Fungi* are composed of the same tissue, variously felted ; and the *Confervæ* are formed of cellular tubes, more or less intermixed and anastomosing. In plants of the *vascular* or *fibrous* tissue, Mirbel distinguishes six principal forms of the vessels : 1. The *Moniliform*, composed of superposed cells with strangulations at intervals, and cribriform or sieve-like partitions (*diaphragmata*.) These vessels are remarked at the origin of the branches or

leaves, and in the roots. In these the sap is filtered before passing into the larger vessels. 2. The *Porous*, or those which are transversely furnished with pores ranged in lines. These are observed throughout the whole vegetable; but they are not continuous, and terminate in cellular tissue. In compact wood the pores are excessively fine. 3. The *Spurious Tracheæ*, or tubes split transversely, differing from the preceding only by these clefts, and chiefly remarked in porous wood. These are the principal canals for the sap, which by means of the clefts is enabled to spread laterally. 4. The *tracheæ* are composed of silvery elastic laminæ in a spiral or double spiral form. They surround the pith or central soft part of Dicotyledonous vegetables, and are concentrated towards the woody fibres of monocotyledonous stems. They are never found in the annual ring or bark, and but rarely in the roots; but they abound in the spongy tissues of vegetables which grow rapidly. 5. The *mixed vessels* are composed of the four previous descriptions modified and transformed into one another in their course. With the exception of the tracheal vessels the others are bent on all sides, and degenerate at their extremities into cellular tissue. 6. The *proper vessels*, which are neither porous nor have any opening in their walls, contain the peculiar fluids of the plant. They are common to the bark, to the leaves, petals, &c. as well as the trunk. Some are in fasciculi; others solitary. Vegetables are besides covered with an epidermis formed of dried plates of the cellular tissue. In some, as the cork, this epidermis is composed of many thick strata or layers.

The more imperfect vegetables, or the Acotyledonous plants, as the *Fungi*, *Lichenes*, *Algæ*, and *Tremellæ*, are simply cellular. The Monocotyledonous vegetables have, besides this cellular tissue, porous and tracheal vessels; and in the Dicotyledonous plants all the kinds of tissue are combined.

It was formerly believed that vegetables were nourished almost by water; but it is now known that the water is decomposed in the tissue of plants, to which it affords hydrogen; and that this water is loaded also with a number of substances of vegetable and animal extraction. The carbonic acid in the air, and other substances absorbed by the leaves, also furnishes a supply of food to plants.

The *sap* or juice of plants is a colourless and transparent fluid, composed of water, of a mucilaginous extractive matter, sa-

line substances, and saccharine and colouring matter. It flows through the vessels, and particularly those which surround the pith, is elaborated in traversing the numerous canals, mixed with the proper juices of the vegetable, and contributes to the growth of its various parts. This sap is most plentiful in spring, when it is drawn upwards for the production of the leaves and fruit; and in autumn, when the period of flowering is past and the leaves begin to fall, in its descending progress. The transpiration of vegetables through the medium of their leaves is very great; and in equal masses in the same time it has been calculated that they transpire seventeen times more than the human body. Besides water, vegetables exhale oxygen by their green parts in the light, and carbonic acid gas in the shade. The water condensed by cold may often be seen in drops of dew at the extremities of the exhalant vessels. During day the leaves transpire most on account of the heat and the evaporation of their fluids, and the sap is then attracted chiefly by the roots. In the night the leaves absorb most, and the sap descends towards the root. Absorption is performed by the under surface of the leaves, transpiration by the upper surface.

The sap elaborated in the organic tissues composes a vegetable gelatinous exudation developed between the bark and alburnum. This substance, which has received the name of *cambium*, is analogous to the exudation which issues from the vessels of animal bodies to unite divided parts or join a wounded surface. The principal destination of this cambium is to form the inner bark or *liber*, as it was called by the ancients, from being used for the purpose of writing. Gradually thickening between the bark and the wood into a membrane or tissue, it becomes attached to the *alburnum*, or outer and softer portion of the wood, and in trees increases by annual layers. A new layer of cortical vessels is also every year added to the bark. Thus, as a tree is so many years old, an equal number of these annual rings occurs; and the age of trees may be reckoned from counting the number of the annual layers. The layers of wood next the central pith or *medulla* in Dicotyledonous plants are hardest from the compression of the annual circles; and the net-work of vessels of the inner layers becomes nearly obliterated, and unable to conduct the vital juices. Thus aged trees begin to decay in the centre, while, as in many very old oaks, the outer portion of the trunk is vigorous and

healthy. These annual rings or layers, however, it may be remarked, are not always exactly concentric around the medullary canal. The layers are thickest on the sides from which the roots derive most nourishment; and the northern side of many trees, being less exposed to heat, is often found less dilated. In this manner do the larger vegetables increase in size much beyond all the other portions of organized nature. The celebrated Chestnut of Mount Etna, 173 feet in circumference, has in the hollow of its trunk a cabin of seven paces broad, and eight in length and height; and Pliny mentions a *platanus* in Lycia, in the hollow trunk of which the Roman Consul Lucianus with twenty of his followers supped and slept.

The *roots* of plants are more or less furnished with radicles, distributed around the main root, and extending in the soil, their tendency being always downwards, as the stem and leaves on the contrary seek the light. There are plants, however, all root, as the truffle; others seem to have scarcely any, as the *Algæ*, absorbing their nourishment by the leaves alone. Some attach themselves by a series of roots, as the ivy, to the stems of other plants, or by a single attachment, as many species of *Fungi*. The *Lemnæ* have floating roots; and many plants develope at their roots tubercles more or less large, as the potatoe. The *Cacti* and other fleshy plants live so little by their roots, that they vegetate in arid sands. Bulbous roots, as the onion, are to be considered as the rudiments of the stems to be developed in future years.

The different kinds of *stems* or *trunks* of plants have received various names according to their structure. These are, the stem (*caulis*), peculiar to herbaceous plants; the trunk (*truncus*), proper to shrubs and trees; the straw (*culmus*), appropriated to grasses; and the scape or stalk (*scapus*) which differs from the others in bearing only flowers. The stem is simple or branched, naked or leafy, straight or flexuous. The peduncles are divisions of the stem supporting the organs of fructification either in a head, a spike, a catkin, or in a corymb, an umbel, panicle, &c. The branches are of the same organization as the stems of which they are divisions, and they for the most part correspond in size to the roots which nourish them.

The leaves of plants are generally in the form of flattened expansions, of which the upper side is greener and more polished than the lower surface, which is porous and unequal. They

are commonly supported by a petiole or leaf-stalk, more or less flexible, irritable in some species of *Mimosa*, and susceptible of flexure in many leguminous plants. Many leaves, however, are very thick and succulent, as those of the aloe; others are hollow or tubular, as the onion; some are subulate and pointed, as in the pines; and the same vegetable often bears different descriptions of leaves at its root and stem. The leaves themselves are infinitely varied in point of form; and many plants bear compound leaves, or leaves of which one is formed by the junction of several leaflets on a common leaf-stalk. Some aquatic plants, as the *Ranunculus aquatilis*, have the leaves at the surface of the water entire, while those below are divided into filaments. The greater part of leguminous plants have pinnated leaves; in the *Umbelliferae* they are compound or laciniate; in the *Rubiaceae*, verticillate; opposite in the *Labiatae*, imbricated, sheathing, distichous, &c. To the base of the leaf-stalk are often attached *stipulae* or *bractea*, small scales or floral leaves, often of a different colour from the general foliage.

The motion of many leaves and flowers, by which the blossoms are closed in the absence of the sun, or at a particular time, according to the species, has been termed the *sleep of plants*; and this is so regular in many that the period of the day may be indicated from an observance of the flowers. Many of the *Syngenesious* plants close their blossoms at the approach of rain; and the common daisy (*Bellis perennis*) is daily seen to expand and shut its petals. To demonstrate that light is the principal agent in regulating the opening of the blossoms, Decandolle placed some plants in a darkened apartment during the day, and lighted it during the night by lamps. Some of the plants began their daily sleep in the obscurity, and expanded at night; but others persisted in their natural predilections. Other flowers, however, as the *Convolvulus purpureus*, open their blossoms only at night. But it seems a general rule, that the appearance and absence of light in the diurnal revolution of the globe regulates the waking and sleeping season both of plants and animals.

Many vegetables are furnished with spines, hairs, glands, and scales, either for their protection from animals, or for security against cold. Most alpine plants are covered by a down or hair more or less long, to secure them from the inclemency of the seasons. The spines are a prolongation of the ligneous part of

the stem in some, as the common hawthorn ; in others, spines are superficial, or a growth from the bark, as in the rose-bush ; and in other plants, as the common nettle, the spines are hollow, and project when touched an acrid or poisonous fluid, nearly by the same mechanism as is found in the fangs of poisonous serpents.

Buds (*gemmæ*) are bodies formed on the sides or summit of the stems and branches of many plants, capable in many cases of producing a complete plant, and containing in embryo the leaves and flowers to be afterwards developed. Some writers have held that the buds originate from the pith alone ; others from the first circle of vessels surrounding the central medullary portion ; others from the tender and new formed outer rings of wood ; and others again, from the pith, wood, and bark conjointly. The buds are generally found in the axillæ of the leaves or terminal, and are the rudiments of the future leaves and flowers ; and their forming on removal from the parent plant a multiplication of the individual, has given rise to the process of *grafting* and *budding* in practical horticulture. The *bulbs* or tubercles of the roots of many plants have the same prolific power ; and several, such as the potatoe, are almost exclusively propagated by the separation of the eye or bulb containing the rudiment of a new plant.

The *flowers* of plants comprise the organs by which fructification is accomplished, and those which surround and protect them. These organs are named the *calyx* or outer cup ; the *corolla* or flower proper ; the nectary (*nectarium*) at the base of some flowers secreting a sweet fluid ; the stamens (*stamina*) ; and pistil (*pistillum*). The essential parts are the *stamina* and *styles*, or the male and female parts of generation. The sexes of plants had been noticed by observers prior to the time of Linnæus ; but this great man established the singular fact by incontestible proofs. Most of the phanerogamous plants are hermaphrodite, or possess stamina and pistils on the same flower ; but others are found on separate florets of the same plants, and some on separate individuals. The *pollen* or fecundating powder drops from the anthers on the pistillum, and the germs of the future plants in the shape of seeds of various descriptions are afterwards ripened in the ovary. The *corolla* or flower, protecting the delicate parts within, is *monopetalous*, *i. e.* consisting of one piece, or *polypetalous*, of many pieces. The colours and forms

of the corolla differ in almost every species ; and varieties without number in the markings of this part of plants occur in cultivated species. In cultivation a flower is said to be double, when from excess of nourishment the stamina become petals.

The *seed*, or ova of vegetables, is formed at the base of the pistil in an organ termed the ovary (*ovarium*,) to which it is attached by a small stalk or filament. When the seed has attained to maturity this filament dries up and breaks, and the ovary opens in various ways, according to the species, for the escape of the seed. The part at which the seed has separated from the ovary is indicated by a small mark or scar, called *fenestra*, *hilum*, or *umbilicus*. In some seeds this scar is of considerable size ; in others scarcely visible. The seed is composed of certain coats or tunics, inclosing a kernel or *nucleus*, also consisting of distinct parts. When these coats are stripped off, the nucleus is brought into view. It consists, as in the bean and most other seeds, of two distinct parts, the lobes or cotyledons, and the radicle and plume. Such seeds as have two lobes or cotyledons, are named *Dicotyledonous*, and form a great division in the arrangement of plants which has for its foundation the structure of the seeds. Seeds which have but one cotyledon or lobe are named *Monocotyledonous* ; and of this division the seeds of wheat, barley, and the grasses afford familiar examples. A third group of plants, including many of the lower tribes, are considered from their minuteness to be entirely destitute of cotyledon, and these have been termed *Acotyledonous*. This description includes the whole of the class *Cryptogumia* of Linnæus ; but some observers have considered the *Filices* and *Musci* as not falling under this division.

The duration of the life of vegetables is various. Some spring up, ripen their seeds, and die within the year. These are termed *annual* plants. Others take two years to reproduce their seeds, and these are called *biennial* ; while others which go on increasing for a term of years are denominated *perennial*. The life of an annual plant, however, may be prolonged to the second year by preventing it from flowering. Monocotyledonous plants generally flower only once, though they grow for years before that period ; and though many of the Dicotyledonous plants survive for centuries, yet the successive growths are merely annual superpositions.

Various systems have been proposed in botany, as well as in other branches of Natural History, for the classification of its numerous objects. Already nearly 60,000 species of plants are known ; and if each were distinguished by individual terms implying its place in the system, the acquisition even of the names would be an intolerable load on the memory. Hence has arisen the necessity of generalization. A number of *species* possessing certain characters in common, though individually distinct, have been arranged under one term including them all, which forms a *genus*. In comparing generic characters together, groups of these agreeing in certain other particulars, form what is called an *order* or *family* ; and orders or families corresponding in some certain distinctive characters form a *class*. This branch of Botanical Science is termed *Taxonomy*, or the theory of classification.

Whatever method the student may fall on to arrive at the knowledge of a species, it is necessary that he study successively the various organs which furnish the characters of the five principal divisions, viz. the *class*, *order*, *family*, *genus*, and *species*. In almost all the methods proposed, the organs of fructification have formed the bases of arrangement, as being the best known, and the most conspicuous. Such were the foundation of the systems of Tournefort, Linnæus, and Lamarck ; and though professedly artificial, the characters derived from these organs brought together groups in many cases very natural. The system of Jussieu, or the Natural Method, is arranged on other principles.

Joseph Pitton Tournefort, born at Aix, in Provence, published his Elements of Botany in 1694. He established his method upon the character of the flower or corolla, as being the most striking part of a plant. He divided the vegetable kingdom into two great sections, *Herbs* and *Trees* ; the first, comprehending annual or perennial plants, the stems of which fade in winter, and of which the consistence was not ligneous ; and the second, including all the plants of a woody consistence, which grew to the height of a man, which had buds, and which generally survived more than two years. They were next divided into such as had or had not a corolla ; and these last into those with simple or compound flowers. Those with the flower or corolla of one piece were termed monopetalous—

those of many pieces, polypetalous. The whole were divided into twenty-two classes. At this period little beyond ten thousand plants were known, which were distributed in about seven hundred genera.

The next great systematic writer that appeared was the celebrated Linnæus. He was born in Sweden in 1707; and his system of botany and other writings were successively published from 1737 to 1777. This great naturalist, from finding the reproduction of plants connected with organs analogous to the sexual organs in other organized beings, founded his arrangement of vegetables chiefly upon the number and position of these organs, and hence his method has been termed the *sexual system*. This system, confessedly artificial, since it brings together in some groups many otherwise discordant species, was nevertheless admirably calculated to facilitate the knowledge of plants in the simplest manner; and from the publication of the *Genera* and *Species Plantarum* of Linnæus, may be dated the establishment of the science of botany on fixed and philosophical principles. Linnæus divides vegetables into twenty-four classes, according to the number, the insertion, the respective length, the union or separation of the stamina. The last class, called *Cryptogamia*, comprehends plants which have no perceptible flowers, as mushrooms, ferns, algæ, &c. In all the other classes the flowers or organs of fructification are perceptible. In the greater number of the classes, the flowers contain male organs or stamina, and female ones, or styles, on the same flower. These are termed *hermaphrodites*; others have the stamina and styles separate. The last three classes but one have the flowers thus disposed, and are hence named *unisexual*. In some the stamina and styles are placed on different flowers on the same stem, (*Monœcia*); in others, stamens and pistils are found on separate plants, (*Diœcia*). And another modification is, when stamens and pistils are found separate and conjoined on the same plant, (*Polygamia*). But the nature of the arrangement will be best understood from an exposition of the characters of the different classes.

Linnæus, as before noticed, divides the vegetable kingdom into twenty-four classes, and forms for each of these a compound term derived from the Greek, which indicates their essential character. Thus, for the first thirteen classes, he gives to the Greek

words which express numbers, the termination of *andria*, (from *ανδρῶς*, a man,) signifying the stamina or male parts of the flower. Thus, *Monandria* characterizes a flower with one stamen; *Dian-dria* a flower with two stamina, &c. and so on. The 14th and 15th classes have the termination *dynamia*, (from *δυναμειν*, to prevail,) from the two or four stamina being longer than the others. The 16th, 17th, and 18th classes have the termination *adelfhia*, (from *αδελφῶς*, a brother,) because the filaments are more or less united. The 19th class is termed *Syngenesia*, to express the anthers being united; and the 20th, *Gynandria*, from the stamina arising from the germen or style. The four remaining classes are characterized by terms having a similar reference to the parts concerned in fructification.

- I. MONANDRIA, the flowers of which contain a single stamen.
- II. DIANDRIA, 2 stamens.
- III. TRIANDRIA, 3 stamens.
- IV. TETRANDRIA, 4 stamens, (all of equal length.)
- V. PENTANDRIA, 5 stamens, (the anthers not united.)
- VI. HEXANDRIA, 6 stamens, (all of equal length.)
- VII. HEPTANDRIA, 7 stamens.
- VIII. OCTANDRIA, 8 stamens.
- IX. ENNEANDRIA, 9 stamens.
- X. DECANDRIA, 10 stamens, (filaments not united.)
- XI. DODECANDRIA, 12 or more stamens arising from the receptacle.
- XII. ICOSANDRIA, about 20 stamens arising from the calyx or corolla.
- XIII. POLYANDRIA, many stamens arising from the receptacle.
- XIV. DIDYNAMIA, 4 stamens, 2 being longer than the rest. (Never more than 1 pistil.)
- XV. TETRADYNAMIA, 6 stamens, 4 being longer than the rest. (Cruciform flowers with 1 pistil.)
- XVI. MONADELPHIA, filaments more or less united. (The anthers free.)
- XVII. DIADELPHIA, filaments forming 2 sets. (Flowers always papilionaceous.)
- XVIII. POLYADELPHIA, filaments forming more than 2 sets.
- XIX. SYNGENESIA, 5 stamens, the anthers united. (Compound flowers.)
- XX. GYNANDRIA, stamens arising from the germen or style, as in the *Orchideæ*.
- XXI. MONŒCIA, stamens and pistils in different flowers on the same plant.
- XXII. DIŒCIA, stamens and pistils distinct; the former confined to the flowers of one plant, the latter to those of another.
- XXIII. POLYGAMIA, stamens and pistils in the same flower, or stamens only, or pistils only; the whole on one plant or on different plants.
- XXIV. CRYPTOGAMIA, plants in the fructification of which stamens and pistils cannot be perceived, or very imperfectly.

These Classes contain a number of Orders, founded on the following characters.

In the first thirteen classes, Linnæus has established his or-

ders from the number of the pistils, and given to each a name compounded of two Greek words, expressive of these distinctions ; the Greek term *gynia*, (γυνή, female,) indicating the pistil, and the other portion of the word, such as *mono*, *di*, *tri*, &c. (μονος, one—δύο, τρεις, &c.) the number of these in the flowers. These orders are, *Monogynia*, *Digynia*, *Trigynia*, *Tetragynia*, *Pentagynia*, *Hexagynia*, *Heptagynia*, *Octogynia*, *Enneagynia*, *Decagynia*, *Dodecagynia*, and *Polygynia*.

In the 14th class are two orders. 1. *Gymnospermia* ; the seeds naked, and usually four, never more. 2. *Angiospermia* ; the seeds inclosed in a pericarp.

In the 15th class there are two orders. 1. *Siliculosa*, the shape of the fruit being that of a *Silicula* or pouch. 2. *Siliquosa*, the fruit forming a long pod or *Siliqua*.

In the 16th, 17th, and 18th classes, the orders are named from the number of stamens, and have the same names as the first thirteen classes.

In the 19th class the orders are five :

1. *Polygamia æqualis* ; all the florets perfect, having stamens and a pistil.
2. *Polygamia superflua* ; florets of the disk perfect, those of the circumference with a pistil only.
3. *Polygamia frustranea* ; florets of the disk perfect, those of the circumference with an abortive pistil, or none at all.
4. *Polygamia necessaria* ; florets of the disk with stamens, those of the circumference with a pistil.
5. *Polygamia segregata* ; several flowers, either simple or compound, but with united anthers and a proper calyx, all included in one common calyx.

In the 20th class the orders are named according to the number of stamens, *Monandria*, &c. So also are those of the 21st and 22d classes, except where there is a union of the filaments ; the orders are then named *Monadelphina*, &c.

In the 23d class there are three orders :

1. *Monœcia* ; two or all the flowers characteristic of the Class found on the same plant.
2. *Diœcia* ; two or all the flowers divided, and found on two separate plants.
3. *Triœcia* ; the three flowers on three separate plants.

The Linnæan orders of the 24th class are,

1. *Filices*. 2. *Musci*. 3. *Algæ*. 4. *Fungi*. Two others have been added by modern botanists, viz. *Hepaticæ* and *Lichenes*. These orders form *Natural Families*, and have been

farther subdivided by those who have made the natural affinities of plants their study.

M. J. B. Lamarck, with the design of uniting to the artificial arrangement the advantages of the natural method, has devised a plan by which all known plants may be ranged in successive divisions, in such a manner as to leave the alternative between two propositions absolutely opposite. This method, which is termed the analytic, he has exemplified in the *Flora of France*, the third edition of which, in four 8vo volumes, by MM. De Lamarck and Decandolle, was published at Paris in 1805.

What is called the Natural Method ranges all vegetables in such a manner, that, disregarding partial correspondence of parts, those which agree in the greatest number of particulars are grouped into families. A disposition to arrange plants according to their general form and structure is traced up to Cesalpinus, an Italian physician, who published, in 1583, the first system in botany. He distributed in fifteen classes the 800 plants known to him, in regard to the disposition of the embryo and the structure of the fruit. Morison, professor of botany at Oxford, added to these characters the general appearance of the plant and the form of the flower; and the celebrated Ray published in 1682, a method in which the characters are drawn from different parts of plants. Linnæus himself attempted to arrange vegetable productions in natural families; and Adanson, in 1763, published his families of plants to the number of fifty-eight, which comprehended 615 genera, disposed in the order which appeared to him most accordant to nature. Previous to this period (1759) Bernard Jussieu had disposed the plants of the botanic garden at Trianon according to a particular method, and after the natural order, but had published nothing regarding the principles which had guided him in this disposition; but his nephew, Antoine-Laurent de Jussieu, after having arranged the *Jardin des Plantes* of Paris according to this method, published the bases of the system under the title of *Genera Plantarum*, in 1789. This method has been successively improved by later French naturalists.

In arranging plants according to the natural order, the structure of the embryo has furnished the first divisions. Thus

plants, of which the cotyledons or seeds are not known, and of which the seminal leaves have not been observed during germination, are called ACOTYLEDONOUS, or not lobed; those which have but one seminal leaf or one cotyledon are named MONOCOTYLEDONOUS, or unilobed; and all the other seeds containing an embryo of two lobes have been termed DICOTYLEDONOUS, or bilobed.

It appears at first sight difficult to determine on viewing a plant in vegetation whether it develops itself with one or two cotyledons, or is destitute of any. But a little observation soon overcomes this difficulty. The Acotyledonous plants have never perceptible flowers nor fruits; they are destitute of stem, roots, or vessels, and their structure is cellular. All other plants are provided with vessels or canals for transporting their fluids. The Monocotyledonous plants have always a cylindrical stem presenting outwardly circular lines or rings indicating the stages of their growth. This stem is destitute of pith or medullary substance in the centre, and has no distinct bark. When cut across there are generally remarked one or many distinct empty fistulous canals. The leaves have almost never branching ribs, but when ribs are found they are disposed longitudinally, and in parallel lines. The Dicotyledonous plants, on the contrary, are distinguished by their possessing a pith or central soft substance, woody fibres, and bark. They have vessels around the medullary canal, and radiated prolongations disposed in such a manner that, as the plant increases in size, the interior vessels are obliterated and new ones developed at the circumference. The leaves of this division have ramified nerves, commonly petiolated and jointed. Their seeds have, as the name indicates, at least two cotyledons, but sometimes more; but these seminal lobes are always opposite or verticillate, and the roots of the germ which they contain pierces the epidermis when vegetating.

M. de Jussieu, to give more facility in the study of plants which germinate with two cotyledons, establishes sub-classes, drawn from the character of the flowers, as unisexual, hermaphrodite, with or without a corolla of one or many petals; and each of these sub-classes may be divided into orders, from the consideration of the insertion of the stamina. This disposition of the stamina, or, which comes to the same thing, of the

monopetalous corolla which supports these organs, and which is here called stameniferous, presents three modes of insertion, 1. *Hypogynous*, where the ovary is free and the stamina or corolla inserted around the circumference of its base. 2. *Perigynous*, where the stamina or corolla are attached to the calyx at a certain distance from the base of the ovary. 3. *Epigynous*, in which the ovary is inferior, and the stamina or corolla inserted on its summit. The following table shows at one view the distribution of M. Jussieu.

					Order.
PLANTS are	ACOTYLEDONOUS, or of which the flowers and seeds are little known				I.
	MONOCOTYLEDONOUS, with the stamina	{	concealed		II.
			{ distinct	hypogynous	III.
				perigynous	IV.
		epigynous		V.	
		{ Apetalous; with the stamina...	epigynous	VI.	
			perigynous	VII.	
			hypogynous	VIII.	
	{	Monoclinous, and	{ Monopetalous; with the corolla	hypogynous	IX.
				perigynous	X.
				epigynous with the anthers { united { distinct	XI.
		{	Polypetalous; with the stamina	epigynous	XII.
				hypogynous	XIII.
				perigynous	XIV.
	{	Diclinous, irregular, or truly unisexual.....			XV.
					XVI.

From this tabular view it is evident that the dicotyledonous plants form the greatest number of orders. In general their flowers are hermaphrodite; and the sixteenth order alone comprehends plants truly unisexual. When among the other orders plants occur of this description, these are to be considered as proceeding merely from the abortion of the stamina, of which the rudiments are almost always to be found. Those vegetables where the male and female organs occur on the same plant are called *Monoclinous*; and the others *Diclinous*.

The following is an abridged view of the Natural Families of Jussieu.

I. The Acotyledonous plants of Jussieu correspond to the plants without corolla, stamina, and fruit of Tournefort; to the Cryptogamia of Linnæus; and to the Agamic plants of Lamarck. They are divided into two great sections or series. 1. Those which have leaves or foliaceous expansions, as the *Musci* and *Hepaticæ*; and, 2. those which are destitute of leaves, as the *Algæ*, the *Lichens*, the *Hypoxylæ*, and *Fungi*. In Dr Greville's *Flora Edinensis* the *Acotyledones* are divided into fifteen orders, viz. 1. *Filices*; 2. *Lycopodineæ*; 3. *Marsilaceæ*; 4. *Equisetaceæ*; 5. *Musci*; 6. *Hepatici*; 7. *Characeæ*; 8. *Algæ*; 9. *Chætiphoroideæ*; 10. *Lichenes*; 11. *Hypoxylæ*; 12. *Fungi*; 13. *Gastromyci*; 14. *Byssoidæ*; 15. *Epihytæ*.

II. Under the name of *Monocotyledones* are comprised all plants of which the seeds develop themselves with one lobe or cotyledon, which incloses and absorbs the juices destined to nourish the embryo plant in its earlier stage of growth. Late observers have discovered that the *Ferns* produce seeds which come up with a small lateral cotyledon; and if this turns out to be generally the case, the method of Jussieu will have an additional order of these plants removed from the class of *Acotyledones*. The *FERNs* (*Filices*) may thus be regarded as Cryptogamic monocotyledonous plants.

III. Four families belong to the order of monocotyledonous plants with distinct stamina, attached below the pistil. These are, 1. the *Gramineæ*, with a culm or jointed stem, sheathing leaves, and a glume or calyx of two valves. 2. The *Cyperaceæ*, with stems almost smooth, leaves not cleft at the base, and with a glume or calyx of one valve. 3. The *Typhaceæ*, with a calyx of three pieces, of which the male organs are always placed above the female in a catkin. 4. The *Aroideæ*, which have the flowers in a catkin, generally protected by a coloured sheath, and which bear berries.

IV. The monocotyledonous plants with distinct stamina placed around the pistil have flowers with the sexual organs united and distinct, always incomplete, but sometimes accompanied with a sheath. These plants form an order numerous in genera. They are distributed into five families, after the apparent connection which seems to distinguish the groups. These are, 1. *Palmæ*, plants with an erect stem, the leaves disposed at the top, and of which the sexes are often in different plants. 2. The *Asparageæ*, with branched stems, hermaphrodite flowers, and fruit of three cells. 3. The *Junceæ*, of which the flowers, with generally six stamina, are enveloped in a kind of united glume or panicle, or corymbose, and producing capsules of three valves. 4. The *Liliaceæ*, comprehending under this name all plants which have an analogy with the lily by the six divisions of the perianth, six stamina, a single style, often with three stigmata, and a capsule of three valves. 5. The *Irideæ* compose the fifth family, and are distinguished by their flowers of three stamina, and by the form of their leaves, which generally sheath or envelope one another.

V. The Epigynous Monocotyledons comprise four small families, distinguished from one another by the number of the stamina and the form of the fruit. Thus, 1. certain genera have but a single stamen and an unilocular capsule, *Orchideæ*; and 2. sometimes three cells, as the *Drymyrrhizeæ*. 3. The other genera have more than two stamina, sometimes six, with the fruit in three cells, as the *Scitamineæ*; and others nine or more stamina, and the fruit in many cells, as the *Hydrocharideæ*.

VI. The Dicotyledonous plants with monoclinous apetalous flowers and epigynous stamina have the perianth of one piece, and a single ovary with many cells. They are all comprised in one family, under the name of *Aristolochiæ*.

VII. The seventh order, which comprehends all apetalous plants with monoclinous and perigynous flowers, is formed of six well-marked families. Three of them bear the stamina upon the summit of the calyx. 1. *Eleagneæ*, which have the ovary inferior or adhering and the seed enveloped in a fleshy perisperm. 2. *Thymeleæ*, of which the ovary is free, the stamina equal in number to the divisions of the perianth, and the fruit without perisperm. 3. *Proteæ*, of which the stamina generally double in number the divisions of the perianth, and the ovary is free. In the other three families the stamina are attached to the base of the calyx. 4. *Laurineæ*: Trees and aromatic bushes, of which the flowers have six or twelve stamina, with a fruit or berry and the seed destitute of perisperm. 5. *Polygoneæ*: Herbaceous plants with the base of the petioles widened, hermaphrodite flowers, the anthers marked with four furrows, and the fruit with a farinaceous perisperm. 6. *Chenopodeæ*: Herbs with sometimes berries, and the seed always covered by a farinaceous perisperm.

VIII. The *eighth* order, with hypogynous stamina in apetalous and monoclinous flowers, comprises four families, which have all a single simple ovary and one seed, or a capsule distinct from the calyx, which is free, and which has often scales in the form of petals. These are, 1. the *Amaranthaceæ*. 2. *Plantagineæ*. 3. *Nyctagineæ*; and 4. *Plumbagineæ*.

IX. The next order is Monocotyledonous monoclinous plants with a monopetalous corolla. The greater or less regularity of the corolla; the proportion and number of the stamina; and the difference in the appearance of the fruit, have served for the subsidiary division of this order into fifteen families. 1. The *Primulaceæ*: Generally herbs with perennial roots and regular flowers, supported sometimes on a common peduncle and disposed in an umbel, or upon a peduncle which arises from the angle of the leaves and the stem. The flowers have a persistent calyx, a tubular corolla, with as many lobes as there are interior stamina. The fruit is commonly a capsule opening in various ways. 2. *Rhinanthaceæ*: Stem generally herbaceous, with simple leaves, and towards the summit axillary flowers, sometimes in a spike; corolla almost always irregular inclosing stamina in even numbers, two, four, or eight; fruit a capsule of two cells and of two valves. 3. *Acanthaceæ*: This family differs from the preceding by the partition of the capsule, which separates in two parts and displays the seeds attached by

hooked filaments. 4. *Jasmineæ* : This family is composed of shrubs or trees which have a tubular calyx and corolla, disposed in a corymb or a panicle, and two stamina. Their fruit is a capsule, a drupe or a berry. Their branches and leaves are for the most part opposite. 5. *Pyrenaceæ* : Herbs or bushes with opposite leaves, with flowers in a corymb or spike, and stamina two, four, or six, but generally four. The greater portion of this family are exotic. 6. *Labiataæ* : This family is extremely natural, and corresponds to the *Didynamia gymnospermia* of Linnæus. All are odoriferous. Their stem is quadrangular, with opposite branches and leaves ; the flower stalks in the axillæ of the leaves ; an irregular corolla of five divisions, of which the two upper, often united, are separated from the other three, and two or four stamina. The fruit is composed of four *cariopses*, with a common style and a forked stigma. 7. *Scrophulariæ* : Herbaceous plants, with the fruit a capsule of one or two cells. They have a disagreeable smell. 8. *Solanææ* : Herbs or shrubs of which the flowers, generally regular, have commonly a calyx in five divisions, five angles in the corolla, five stamina, and a single style, which gives rise to a capsule or berry. The flowers arise almost always from the axillæ of the leaves. The plants of this family are of a sombre aspect and disagreeable smell. 9. *Boragineæ*, or *Asperifoliæ* ; the last name being given from the greater part of the species having their leaves covered with asperities or rough hairs. In this family the flowers have their external parts divided into five ; the ovary has four lobes, and there is but one style. 10. The *Convolvulaceæ*, of which species are found in all climates, have always simple and alternate leaves, and the stem often climbing. Their flowers are bell-shaped, with five stamina, alternating with the lobes of the limb when they exist ; ovary simple, surmounted with one or many styles, forming a capsule with two or at most three cells. 11. The *Polemoniaceæ* are mostly exotic plants, much resembling the preceding family. They differ, however, in the capsule, of which the central receptacle has partitions corresponding not to the suture of the valves but with one side, or a projecting ridge in their middle. 12. The *Bignoneæ* have commonly an irregular corolla, disposed in a panicle, with four didynamous stamina, and one sterile, to which succeeds a fruit of two cells. 13. The *Gentianeæ* have opposite leaves, generally without a leaf-stalk, and entire. The corolla dries up without falling, and the fruit is a simple capsule, or deeply divided into two lobes, containing many seeds in a fleshy perisperm. 14. The *Apocyneæ* are plants, the greater portion woody, which turn from right to left, the inverse of many other climbing plants. Their corolla is often accompanied with particular appendages ; and their seeds, generally covered with

hairs, are enclosed in two follicular plates, broadest in the middle. 15. The *Sapotæ* or *Hilospermæ*, named thus from their seeds having a very distinct umbilicus, are exotic shrubs and trees with a milky juice, simple and alternate leaves, the flowers small, and in bundles, and the fruit berries or drupes.

X. The tenth order of Natural Families includes Dicotyledonous, monoclinous, monopetalous plants with the stamina inserted around the pistil. It comprehends four families. 1. *Ebenaceæ*: Trees or shrubs, for the most part exotic, among which are found the tree producing the wood called ebony. 2. *Rhodoraceæ*: Shrubs of which the leaves during their developement have often their margins rolled downwards. 3. *Ericææ*: Shrubs with very small leaves, often opposite or verticillate. The corolla generally dies on the stem and suffers little change of colour; and the anthers are often forked at their base. 4. *Campanulaceæ*: These are for the most part herbaceous plants, with the stem inclosing a milky juice. Their leaves are simple, often dentated. The calyx is attached to the ovary, and unites with it.

XI. XII. The eleventh and twelfth orders comprise all the genera of plants with a monopetalous corolla inserted above the pistil, as in the compound flowers and others. But the union of the anthers, which forms the character of the *Syngenesia* in the sexual system, indicating a natural division, M. Jussieu preserves it. The compound flowers are so named because their flowers include a great number of small florets surrounded by a common calyx, or rather by bracteæ, which seem to constitute a single flower. All the florets inclose five stamina of which the filaments, arising from the corolla, surround the pistil, and are joined by the anthers. The ovary is always simple, but sometimes the style is terminated by two stigmata. The seed is often surmounted with a tuft of hairs, sometimes simple, sometimes ramified and crossed by lateral hairs, which are hygrometrical. The central portion of the common flower, upon which the seeds are placed, named the receptacle, is naked, chaffy, or bristly. 1. The *Chicoraceæ*, corresponding to the semi-flosculose or ligulate flowers, have all their florets hermaphrodite, tubular, and tongue-shaped. The receptacle is thin, the greater part have a milky juice when young, and their leaves are alternate. In many of the species the flowers expand in the morning and close towards mid-day. This family includes many genera. 2. *Cinarocephalæ* or *Capitataæ*. These have all the flowers flosculose, that is, composed of tubular and not tongued-shaped florets. The greater part are hermaphrodite, though there are some neuters and females. They have commonly a chaffy or hairy receptacle; the seeds are crowned with a sessile tuft of simple or plumose hairs; and the

leaves, always alternate, are often spinous, as well as the scales of the calyx or bracteæ. 3. The *Corymbifera*, *Discoidea* or *Radiata*, have received these different names as indicating their appearance. All have flowers disposed in a corymb, in which the centre or disc is often less elevated than the circumference, of which the ligulate corollæ form rays; but their principal distinction is in the disposition of the flowers. This numerous family is subdivided into two sections; *first*, into those genera with the receptacle naked; and *secondly*, those with the receptacle chaffy.

The other monopetalous flowers with the corolla epigynous and with distinct anthers have all a particular calyx. They are often aggregated or capitate in a sort of spurious calyx formed by the floral leaves. Some have but a single seed crowned by the interior calyx, which is persistent, and the leaves of these are always opposite, as the *Dipsacæ*. Others have two naked heads, or many inclosed in a pericarp; and these have the corolla tubular, and verticillate or opposite leaves united by stipulæ, as the *Rubiaceæ*. In others the corolla is very deeply cleft, so as almost to appear polypetalous, and the leaves never furnished with stipulæ, as the *Caprifoliaceæ*.

XIII. The Dicotyledonous plants with monoclinous and polypetalous flowers are divided into three large orders, as seen in the tabular view, according to the insertion of the stamina above, below, or around the pistil. The Epigynous flowers, although in great number, form but two families, of which one, the *Araliæ*, comprehends the genera *Aralia* and *Panax*, both exotic, and of which the flowers have many styles. The other family bears the name of *Umbellifera*. They have received this name from the disposition of their flowers in an umbel or umbrella form. The greater portion are biannual herbs, with a channeled fistulous stem, or filled with a loose, cottony tissue. The flowers are generally hermaphrodite, with five stamina and five petals, and their fruit is composed of two seeds united. They are further distinguished as the flowers are simple, or the particular peduncles not subdivided, and bearing but one flower; or as compound, when each primary peduncle which radiates from the general stem is itself subdivided into secondary umbels or umbellulæ. At the origin of the peduncles there are often found floral leaves or bracteæ forming a kind of collar or *involucrum*. When these are below umbellulæ or smaller umbels it is termed *involucella*. Many subsidiary divisions are used to arrange the genera of this extensive family.

XIV. The Dicotyledonous, monoclinous, polypetalous plants with stamina placed *below* the ovary are very numerous, and have been arranged into many families. 1. *Ranunculaceæ*: This large

family have a regular corolla, generally composed of at least four petals. The stamina are commonly above twenty in number, are inserted upon the receptacle, and are neither attached to the calyx nor the corolla. The ovaries are numerous. The greater portion are herbaceous, with alternate leaves, often deeply cut and as if sheathing, but without stipulæ. 2. *Papaveraceæ*: These have for the most part a caducous calyx composed of two segments; the corolla is formed of four petals; and they have but one ovary without a style, which changes into a capsule of one cell. Their leaves are alternate, and almost all have a proper yellowish or white juice. Some have numerous stamina, and others an indeterminate number, commonly below six. 3. *Cruciferaæ*, or the *Cruciformes* of Tournefort. These have always four petals disposed in a crucial form, a calyx of four segments, six tetradynamous stamina, a simple ovary, changing into a pod or pouch, herbaceous stems, and alternate leaves. The divisions established by Linnæus are very convenient for distinguishing the numerous genera of this family. 4. The *Capparideæ* are herbs or shrubs of which the flowers are composed of a foliaceous calyx, four or five petals, numerous stamina, and a simple ovary supported on an elongated pedicle, which changes into a pod or berry with one cell, and in the pulp of which the seeds are lodged. 5. *Saponaceæ*: Exotic trees or bushes, with alternate leaves and flowers almost similar to the preceding, generally with eight stamina; the ovary sessile, and succeeded by a drupe or berry, of which the divisions or cells inclose one seed. 6, 7. The two families *Aceraceæ* and *Malpighiaceæ* have much affinity together. They are trees and shrubs with the calyx of a single piece, often with five deep divisions, and persistent after the fall of the corolla, which is composed of five petals. The stamina are distinct, and there are two stigmata at most in the first family; they are monadelphous, and with three stigmata in the second. 8. The family of *Hypericinæ* is composed of herbaceous plants or small shrubs with simple, opposite leaves, dotted, or filled with small semitransparent vesicles when seen against the light. Their flowers are of a yellow colour, in a corymb, composed of five pieces in the calyx and corolla. The stamina are polyadelphous, and the ovary simple, and with many styles. 9. The *Guttiferaæ* are exotic trees and shrubs, of which almost all the species furnish a gummy or resinous juice, from their roots, trunk, or branches. They have generally four petals, numerous stamina, and a simple ovary, which forms a capsule of one cell. Some have no style. 10. *Hesperideæ*, to which belong the orange, lemon, &c. Their stem is always woody, their leaves alternate, and of a fine green, often dotted or vesicular. Their flowers are hermaphrodite, odoriferous,

with a simple ovary, to which succeeds a soft fruit with many cells. To this family belongs the tea shrub. 11. *Meliaceæ*: This family comprehends exotic trees and shrubs, remarkable for their flowers having monadelphous stamina, of which the anthers are placed at the summit or on the internal face of the tube formed by the junction of the filaments. The corolla is composed of four or five large petals; the ovary is simple, and the fruit is a berry or capsule. 12. *Viniferæ* or *Sarmentaceæ*: Climbing shrubs with alternate leaves furnished with stipulæ. Their flowers are hermaphrodite with four or six petals or stamina, the ovary simple, and a single style. The fruit is a berry and the seeds are stony. 13. *Gera-noideæ*, so named from the seeds being terminated by an elongated beak which has been compared to the bill of a crane. The leaves, furnished with stipulæ, vary much in disposition and form. The peduncles bear often many flowers, which arise from the opposite side of the leaves when they are alternate, and from their axillæ when they are opposite. The corolla is formed of five often unequal petals, with from five to ten stamina, generally joined by filaments. 14. *Malvaceæ*: Herbaceous plants, trees, and shrubs sometimes in the same genus. They are distinguished by their calyx and double or single corolla of five pieces; by their monadelphous stamina, and their simple fruit, composed of many cells or many capsules. Their leaves are generally simple and alternate. 15. *Tulipiferæ*: Trees and shrubs of which the solitary flowers are very large and odoriferous. Their leaves are alternate, with caducous stipulæ. The flowers have stamina varying in number, and always many ovaries. 16. *Glyptospermæ*: Exotic trees or bushes, so named from their seeds being always furrowed across. Their leaves are alternate, destitute of stipulæ, and their flowers are composed of a calyx of three lobes, and of a corolla of six petals, of which the internal three are smallest. The stamina are numerous, as well as the ovaries, and the fruit is a capsule or berry. 17. *Menispermoideæ*: Exotic and ligneous plants, generally twisted or climbing, with alternate leaves and axillary flowers, often unisexual by abortion, and disposed in clusters or in a spike. 18. *Berberideæ*: Herbaceous or ligneous plants of which the principal character consists in the insertion of the anthers upon their filaments by the external surface, and opening from the base to the summit. 19. *Tiliaceæ*: Trees with a flexible fibrous bark, with alternate stipulate leaves; the flowers commonly hermaphrodite; the stamina numerous or monadelphous, and the fruit a berry or a capsule. 20. *Cistæ* or *Cistoideæ*: Ligneous or herbaceous plants with simple and very often opposite leaves; large flowers, disposed in clusters or a corymb, but of short

duration; five petals; calyx of five segments, numerous stamina, and a simple ovary forming a capsule. 21. *Rutaceæ*: This family resembles the preceding, but has ten stamina and a multilocular fruit. 22. *Caryophylleæ*: Herbs with rounded and branched stems; leaves generally opposite, simple, and not dentated, with axillary, sometimes terminal flowers. This family is subdivided into genera with three stamina; those with four; those with five or eight; and those with ten.

XV. The fifteenth order, or Dicotyledonous plants with the stamina inserted around the pistil, and the calyx of a single piece and lobed. Flowers of many petals, commonly hermaphrodite, or at least both sexes on the same plant; ovary free, sometimes adherent. This order is composed of thirteen families. 1. *Portulacææ*: Herbs and shrubs with leaves often thick and succulent, furnished with stipulæ or axillary hairs; fruit a free capsule of one or many cells. 2. *Ficoideæ*: With thick and fleshy leaves; flowers with a great number of narrow petals; fruit a capsule of many cells; ovary free or adherent. 3. *Crassulacææ*: Petals corresponding to the divisions of the calyx; leaves thick and fleshy. 4. *Saxifrageæ*: Herbs and shrubs distinguished by two kind of horns on the ovary produced by the drying and hardening of the styles. 5. *Cactoideæ*: This family is composed of one genus, of which the species, deprived of leaves, are generally furnished with bundles of spines; flowers solitary; and the fruit pulpy. 6. *Salicariæ*: Herbs and shrubs with hermaphrodite flowers; a persisting calyx of one piece, with petals in the intervals of the lobes as well as stamina, of which the number is equal or double; fruit a capsule, not adhering to the calyx. 7. *Onagrariæ*: Resemble the preceding family, but their ovary is adherent. 8. *Myrtoidæ*: Trees and shrubs for the most part exotic, but of which many species are cultivated in Europe on account of the agreeable perfume of the flowers. All have the leaves and branches opposite, simple, without stipulæ, but sometimes vesicular, and the calyx of a single piece. 9. *Melastomeæ*: Petals four or five, ovary adherent. 10. *Rosacææ*: Ligneous or herbaceous plants with persistent calyx, divided into lobes, of which the number is the same as the petals, or equal to the half of them; stamina generally beyond twenty. This family is divided into six sections: 1. Those of which the ovary is simple, with many styles, and the fruit an apple of many cells, crowned by the calyx. 2. The fruit a pericarp formed by the inflated calyx, and narrowed at the orifice, penetrated by styles corresponding to the number of the seeds. 3. With few ovaries, concealed by the calyx, and the flowers often without petals and unisexual. 4. With numerous ovaries support-

ed on a common receptacle. 5. Ovaries free, but few in number, and forming small capsules. 6. Those of which the fruit is a drupe. 11. *Leguminosæ*, or *Papilionaceæ* of Tournefort. The greater part of the species correspond to the Diadelphous plants of Linnæus. 12. *Terebinthaceæ*. Aromatic and resinous trees, which furnish by incision of their trunks or branches gum-resins or balms. Their leaves are alternate, without stipulæ, generally ternate or winged. Their fruits vary much. 13. *Frangulaceæ* or *Rhamnoideæ*. Shrubs with simple leaves furnished with stipulæ; small flowers, with stamina in equal number with the petals; ovary free, surrounded by the centre of the calyx, which changes into a berry or capsule.

XVI. The last order of the Natural Method, includes Dicotyledonous plants with the stamina separate from the pistil, with or without perianth. Their ovary is generally free. This order is divided into five families, viz. 1. *Cucurbitaceæ*: Climbing or creeping plants with rough stems, alternate, petiolate, lobed leaves, and axillary flowers, which are rarely hermaphrodite, sometimes dioicous, but oftenest monoicous. Their perianth is double, and the interior hollowed in the form of a bell and persistent; stamina three to five, and the anthers marked with projecting and sinuous lines. 2. The *Euphorbiaceæ* form a family of plants of all sizes, herbaceous or ligneous, of which the proper juice is milky and acrid. They are distinguished by their capsules being equal in number to the styles, forming monospermous cells, which open with elasticity in drying. 3. *Urticeæ*: Trees, bushes, and herbs, of which the greater portion have an acrid and corrosive juice. Their flowers are solitary or clustered, small, greenish, and not very conspicuous. The genera are divided into those of which the fruit is fleshy and the flowers placed on a common receptacle; and those of which the flowers are solitary or united in a spike. 4. *Amentaceæ*: The plants of this family are generally trees with caducous and alternate leaves, not resinous, with a thick bark, the male flowers disposed in catkins, and without corolla. The fruits are of various form. 5. *Coniferae*: This family comprehends all the pines, or resinous trees with monoicous or dioicous flowers, of which the males are disposed in catkins and the females solitary, but generally united in a cone or spike covered by solid crowded scales.

M. Decandolle, one of the most eminent modern botanists, author, among many other works, of the *Théorie Élémentaire de la Botanique*, and *Prodrome du Système Naturel du Règne Végétal*, has placed the families in a linear and in consequence somewhat artificial form. Vegetables are, according to this author, arranged under

two great divisions, viz. I. *CELLULAR* or *ACOTYLEDONOUS*, that is, composed of cellular tissue destitute of vessels, with an embryo without cotyledons or seminal leaves. II. All other vegetables are *VASCULAR* or *COTYLEDONOUS*, that is, composed of cellular tissue and vessels, with an embryo provided with one or many cotyledons. The First Division forms two groups, the one comprehending cellular plants with a foliaceous appearance and known sexes as the *Musci* and *Hepaticæ*; and the other aphyllous plants, or those destitute of foliaceous expansions, and without known sexes, as the *Lichenes* the *Hypoxyla*, the *Fungi*, and the *Algæ*. The Second Division forms also two groups; 1. *Exogenes*, or dicotyledonous plants which have vessels in concentric circles, of which the youngest are exterior, and in which the embryo has seminal leaves or cotyledons, either opposite or verticillate: And 2. *Endogenes*, or Monocotyledonous plants which have vessels disposed in fasciculi, of which the most recent formed are in the centre of the stem, and provided with solitary or alternate cotyledons.

The *Exogenes* have either a distinct calyx and corolla, and are then said to have a double perianth; or their calyx and corolla forming but one envelope, they are then said to have a simple perianth. In the first case the families which have a double perianth, or a corolla with one or many petals, and these simple or compound corollæ placed *under* the pistil or *around* it, are termed *hypogynous* or *perigynous* to indicate these two dispositions.

The *Endogenes* are also divided into two series, the first comprehending plants of which the fructification is visible and regular, and termed *Phanerogamous*; the second, including those of which the fructification is concealed, unknown, or irregular, *Cryptogamous*.

The Dicotyledonous plants with a double perianth, of which the corolla is formed of many pieces, and not adhering to the calyx, but attached to the receptacle below the pistil, include the following families: viz.

Ranunculaceæ, Dilleniaceæ, Magnoliaceæ, Annonaceæ, Menispermaceæ, Berberideæ, Podophyllaceæ, Nympheaceæ, Papaveraceæ, Fumariaceæ, Cruciferae, Capparideæ, Flacourtianæ, Bixineæ, Cistineæ, Violariæ, Droseraceæ, Polygalæ, Tremandreæ, Pittosporæ, Frankeniaceæ, Caryophyllæ, Lineæ, Malvaceæ, Bombaceæ, Byttneriaceæ, Tiliaceæ, Elæocarpeæ, Chlenaceæ, Ternstroemiaceæ, Camellieæ, Olacineæ, Aurantiaceæ, Hypericineæ, Guttiferæ, Marcgraviaceæ, Hippocrateaceæ, Erythroxyloæ, Malpighiaceæ, Acerineæ, Hippocastaneæ, Rhizoboleæ, Sapindaceæ, Meliaceæ, Ampelideæ, Geraniaceæ, Tropæoleæ, Balsamineæ, Oxalideæ, Zygophylleæ, Rutaceæ, Simaroubæ, Ochnaceæ, Coriariæ.

The Endogenous plants having flowers with a double perianth, but the petals inserted on the calyx, comprehend the following families:

Frangulaceæ, Samydæ, Zanthoxyloæ, Juglandæ, Terebinthaceæ, Leguminosæ, Rosaceæ, Salicariæ, Melastomeæ, Myrtineæ, Combretaceæ, Loasæ, Onagrariæ, Ficoidæ, Portulacæ, Nopaleæ, Grossulariæ, Crassulaceæ, Saxifrageæ, Umbelliferae, Araliaceæ.

The Dicotyledonous plants with a double perianth, but with the corolla formed of a single petal attached to the calyx, are included in the following families :

Caprifoliæ, Loranthæ, Rubiaceæ, among which are arranged the Guettardaceæ, Cinchonaceæ, Coffeaceæ, and Astreæ : Operculariæ, Valerianæ, Dipsaceæ, Compositæ, subdivided into Corymbifera, Cinarocephalæ, Labiatifloræ, Chicoraceæ ; Campanulaceæ, Lobeliaceæ, Cucurbitaceæ, Gesneriæ, Vacciniæ, Ericinæ, Aquifoliaceæ.

Plants with two cotyledons, and the calyx and corolla monopetalous but not attached to the calyx, or hypogynous, are,

Myrsinæ, Sapotæ, Ebenaceæ, Oleinæ, Jasmineæ, Pedalinæ, Strychnæ, Apocynæ, Gentianæ, Bignoniaceæ, Polemonidæ, Convolvulaceæ, Borraginæ, Solanæ, Personeæ, such as Antirrhinæ and Rhinanthaceæ ; Labiata, Myoporinæ, Pyrenaceæ, Acanthaceæ, Lentibulariæ, Primulaceæ, Globulariæ.

The last division of plants with two cotyledons comprises all the species of which the flower has but one envelope, that is, a simple perianth formed of a calyx or corolla, viz.

Plombagineæ, Plantaginæ, Nyctaginæ, Amaranthaceæ, Chenopodeæ, Polygonæ, Laurinæ, Myristicæ, Proteaceæ, Thymelæ, Santalaceæ, Eleagneæ, Aristolochiæ, Euphorbiaceæ, Urticæ, to which are united the Piperitæ and Artocarpeæ ; Amentaceæ, Coniferæ.

The Monocotyledonous or Endogenes, of which the fructification is evident and regular, are distributed into families under the following names, viz.

Cycadeæ, Hydrocharidæ, Alismaceæ, Pandanæ, Aroidæ, Orchidæ, Drymyrhizæ Musaceæ, Iridæ, Hemodoraceæ, Amaryllidæ, Hemerocallidæ, Dioscoreæ, Smilacæ, Liliaceæ, divided into Asparagæ, Trilliaceæ, Asphodelæ, Bromeliæ, and Tulipaceæ ; Colchicaceæ, Commelinæ, Palmæ, Junceæ, Typhaceæ, Cyperaceæ, and Graminæ.

Four families of plants regarded as Monocotyledonous have no visible flowers, and are termed Cryptogamous. These are the *Equisetaceæ*, *Marsilaceæ*, *Lycopodineæ*, and *Filices*.

On the uses of Plants in the economy of Nature much has been written, and much remains to be discovered. The family of Fungi furnish many agreeable substances for the table, although some species are poisonous. Those which are so owe this quality to an acrid principle which dissolves easily in boiling water, and is destroyed by vinegar. The greater part of the agarics with a milky juice are dangerous.

Fungi of all kinds appear intended to hasten decomposition of organized bodies, particularly vegetables ; and many minute species are found on decayed wood stalks of plants and leaves. Among the Algæ, some afford by burning an impure soda or kelp, employed in soap-making and in the manufacture of glass, and many of the lichens furnish a colouring matter used in dying. Mosses have not been turned to much ac-

count; but in a general view they protect other plants from the severity of cold, and form an important part of the process by which sterile or naked rocks are gradually covered by vegetation. Among the ferns are found substances useful in medicine and the arts.

It is in the family of Grasses (*Gramineæ*), however, that the most useful plants are found. It is sufficient to mention wheat, rye, barley, oats, rice, and maize, which form the chief food of men and cattle. One species is well known as affording in abundance the sugar of commerce. The stalks of the *Cyperaceæ* and *Typhaceæ*, which vegetate in marshes and ponds, are employed to cover houses, in the manufacture of mats, &c. and one of the family furnished the ancients with their *papyrus*, or paper for writing.

The family of *Aroideæ* are singular for the faculty which the plants possess of entrapping flies. By their disagreeable and cadaverous smell, the flies are attracted to deposit their ova, and are retained by the particular structure of some spines. The palms of eastern countries are particularly valuable to the natives of these countries. The stems, the sap, the fruit, are all turned to useful purposes, and even the twigs are formed into mats, seats, and cordage. The date palm is well known as furnishing a grateful food; another species affords by distillation the spirituous liquor known by the name of arrack. The *Asparagineæ* produce some useful medicines, as sarsaparilla, dragons-blood, &c. and the young shoots of one species are esteemed for the table. The *Junceæ*, from the flexibility of their stems, are employed for many purposes; and some species, as ordinary saffron (*Crocus sativus*), and the meadow saffron (*Colchicum autumnale*), are used in medicine.

Among the *Liliaceæ*, the bulbs of the *Scilla* and others are employed in medicine; and many are cultivated as ornamental in gardens. Several very useful plants occur in this family, as the onion, the shallot, and the anana. From the bulbous roots of some *Orchideæ* are drawn Salep; the *Scitamineæ* furnish a grateful food in the banana to the inhabitants of the torrid zone. The *Lauristineæ* afford cinnamon and sassafras; the *Jasmineæ* the olive; and the *Labiataæ* camphor and aromatic oils.

The family of *Solaneæ*, by a singular contrast, contains some of the strongest vegetable poisons and one of the most useful

plants. The Belladonna, Stramonium, and Dulcamara, are active poisons, while the potatoe, of the same family with the two former, and of the same genus with the latter, originally from America, forms an essential part of food all over Europe. Almost all the *Gentianæ* are tonic and useful in medicine. The *Ericaceæ* are cultivated for the verdure and beauty of their foliage and the permanence of their flowers. The *Corymbiferæ* are bitter and resinous, and many species are employed in medicine. Among the *Rubiaceæ* is the Quinquina or Jesuit's Bark, and the coffee-tree. The roots, the leaves, and the seeds of the *Umbelliferæ* furnish useful articles in medicine and domestic economy. Among the *Ranunculaceæ*, some are esteemed for the beauty of their flowers, and others are used officinally. Opium is the product of one species of *Papaveraceæ*, (*Papaver somniferum*.) Among the *Cruciferæ* the turnip may be mentioned as one of the most useful species; and the *Hesperideæ* includes the orange and lemon. The vine is the most useful plant among the *Sarmen-taceæ*. The *Geranideæ* are cultivated for the beauty of their flowers and foliage. The *Malvaceæ* afford a mucilaginous juice employed in medicine; and to this family belongs the shrub which produces cotton. The *Caryophylleæ* are admired for the beauty of their flowers and their perfume; one species of *Linum* furnishes the material for linen, and the expressed oil of the seeds a useful ingredient in the arts. To the *Rosaceæ* belong the most agreeable fruits, as the apple, pear, apricot, &c.; and the *Leguminosæ*, next to the grasses, furnish the greatest quantity of vegetable food. The *Terebinthaceæ* produce resinous matters known by the name of balms; the *Euphorbiaceæ* an acrid corrosive juice; and to the *Cucurbitaceæ* belong the melon and cucumber. The *Urticeæ* afford mucilaginous and sweet fruits, as the fig, the bread-fruit tree, the hop, hemp, and pepper; the *Amentaceæ* include many of the largest and most useful trees; and the *Coniferæ* comprehend those trees which retain their leaves in winter and produce a resinous wood, applied extensively to use in various constructions.

In merely noticing a few of the families producing the more important substances which have been adapted to use, it is by no means to be understood that those not mentioned are of little or no importance in the economy of Nature. All are

the food or the habitation of numberless living beings, many of them apparently of little use to man, but necessary to complete the most beneficent purposes. And the little that is accurately known of the cultivated species, or the few used in medicine, leads to hope that others of equal importance may still be discovered. It is singular that even the native country of most of the *Cerealia* is far from being ascertained; the identical plants which furnish many of the most approved medicines used in Europe are not satisfactorily known; and it is not extravagant to expect, that when the science of botany shall have farther explored the almost innumerable vegetable substances of which at present scarcely any thing is known beyond the name, many articles may still be added to the list of those useful as food, in the arts, or as agents in mitigating human ailments.

The number of plants known to botanists is about 60,000 species; and from the great portions of the globe yet to be botanically explored, it is conjectured 40,000 more may be added to this number.

In the preceding sketch of the Vegetable Kingdom, it has been the object rather to give a general view of this great branch of Natural History, as connected with the previous classes of organized beings, than to enter into details. The science of Botany includes objects so numerous, that these details must have been imperfectly given in any space that could have been here allotted for this purpose. This, however, is the less to be regretted, as we possess in the English Language many valuable works in which the principles of the science are minutely explained. Such among many others are Hull's *Elements of Botany*—the late Sir James Edward Smith's *Introduction to Botany* and *Grammar of Botany*: And to the practical botanist, the *English Botany* and *English Flora* of the same author—the *Flora Scotica* of Dr Hooker—and the *Flora Edinensis* of Dr Greville describe the indigenous species and indicate their localities.

III.—MINERAL KINGDOM.

THE Third great division of Natural Bodies is the Mineral Kingdom, including all unorganized substances either on the surface or in the interior of the globe. This branch of science is termed MINERALOGY. In its most extended sense, it not only indicates the characters by which the different inorganic substances may be distinguished from one another and classed, but their affinities, their geognostical relations or position, their relative importance in the constitution of the globe, the countries which furnish them, and their uses in nature and the arts. Prior to the modern discoveries in chemistry the nature of the objects of the mineral kingdom were but imperfectly understood, and the methodical classification founded on no philosophical basis. Aristotle divided mineral bodies into two divisions, Terrestrial or earthy, and Aqueous or metals. Theophrastus adopted the two classes of Aristotle, but subdivided them into Stones and Earths, of which he formed groups according to their hardness, density, or their affection by fire. Dioscorides and Pliny followed the older arrangement: but Avicenna, a celebrated physician of the twelfth century, divided mineral bodies into four classes, viz. Stones, Metals, Salts, and Sulphurous or inflammable substances.

A crowd of writers on mineralogy occur from this period to the era of Linnæus. This celebrated naturalist, applying his peculiar terminology to the science, divided minerals into three Classes, viz. PETRÆ, MINERÆ, and FOSSILIA. He took his characters not only from the external appearance, but from the chemical characters of dissolution by acids and the action of fire; and his was the first methodical distribution of minerals into which the consideration of the form of the crystals entered.

The subsequent discoveries in chemistry had a powerful influence on the progress of mineralogy; while MM. Romé-de-l'Isle

and Haiüy, by directing particular attention to the geometrical forms of the crystals, afforded bases for more precise specific characters. These different modes of considering mineral bodies have given rise to a great variety of opinion as to the proper mode of classifying them. Berzelius and others contend for an arrangement by which the species should be grouped in conformity with their chemical composition; others, as Werner, Hoffman, &c. reject the pure chemical and adopt a mixed method, formed on the consideration of both external and chemical characters; while Mohs and Jameson arrange mineral bodies by their external characters alone. That system which takes the whole structure and qualities of the objects into view, is certainly the most philosophical; but for the purpose of ascertaining individual species, and placing them in their particular Genus, Order, or Class, the external characters, as in other branches of Natural History, are the most simple and striking. The chemical combinations, requiring the assistance of another science, though not less necessary to be known, follows of course the knowledge of the name and place of the body in the series; and this again leads to the consideration of the use of the substance in the arts, and its situation in the structure of the earth.

Mineralogy is divided into two great branches, viz. MINERALOGY, properly so called, and GEOLOGY: the first treating of the properties and relations of simple minerals;—the second the various properties and relations of mountain rocks, or those mineral masses of which the crust of the earth is composed, and which are generally of a compound nature. In giving a slight sketch of these two great divisions, the arrangement followed by Professor Jameson in his *Manual of Mineralogy* * is chiefly adopted.

The external characters employed in the construction of the principal divisions are, 1. *Form*; 2. *Cleavage*; 3. *Hardness*; and 4. *Specific gravity*.

1. FORM.—The fundamental forms of minerals are four: 1. The *Rhomboidal*, or that in which the crystals resemble the rhomboid in their general properties. 2. The *Pyramidal*, in which the crystals assume the form of an isocles four-sided pyramid.

* *Manual of Mineralogy*: containing an account of Simple Minerals, and also a Description and Arrangement of Mountain Rocks. Edinburgh, 1821.

3. The *Prismatic*, in which the crystallization assumes the form of prisms: And 4, the *Hexahedral* or tessular form. It has been observed, that crystallization could not have taken place, if the integral atoms of a solid had not been free and moveable upon one another. Many general causes determine the circumstances which favour crystallization, or this geometrical and regular union of solid particles, such as repose, precipitation, loss of caloric, decomposition, and consequently new chemical combinations. It is probable that in each species of bodies the integrant particles have determinate and constant forms, which, by their disposition upon one another, produce the different figures assumed by the crystals.

2. *CLEAVAGE*.—To have an exact idea of a crystal, it is necessary to ascertain its structure by a kind of dissection, or as it is termed *Cleavage*. This is the property which minerals possess of splitting in certain determinate directions. The faces or planes thus obtained, termed the faces of the cleavage, are more or less smooth and shining, and represent members of the aggregated crystallization characteristic of the mineral.

3. *HARDNESS*.—Another important external character in mineral bodies is their comparative *Hardness*. This is generally expressed in numbers, formed from a scale derived from a series of substances of different qualities in this respect. The most precise scale hitherto proposed, is, according to Professor Jameson, that of Mohs, in which a series of mineral substances of varying hardness serves the purpose of comparison. Thus

No. 1. denotes the hardness of common and Venetian talc.

No. 2. is the hardness of a variety of prismatic gypsum with imperfect cleavage and transparency. Varieties perfectly transparent and crystallized are too soft.

No. 3. Hardness of a cleavable variety of calcareous spar.

No. 4. Hardness of fluor spar.

No. 5. Hardness of apatite.

No. 6. Hardness of prismatic felspar.

No. 7. Hardness of rhomboidal quartz.

No. 8. Hardness of prismatic topaz.

No. 9. Hardness of rhomboidal corundum.

No. 10. Hardness of octahedral diamond.

A series of specimens of the minerals now named and thus numbered, is used as a comparative scale; and the hardness of

any given mineral is ascertained, by trying which of the specimens it will scratch. Beginning at the highest number, the series is descended till the member which the given substance will or will not scratch. The hardness of the body is now compared with these two bounding numbers, by passing corners of the substances over a fine file; and the resistance of the substance to the file, allows a pretty accurate comparison of the relative hardness. The degree of hardness is then expressed by the number to which the substance most approximates in this respect; and minute shades of hardness are expressed by decimals, supposing ten equal divisions to intervene between each member of the scale.

4. SPECIFIC GRAVITY.—The specific gravity of minerals, as compared with water, is determined by means of the hydrostatic balance, and other instruments.

Other characters employed in the description of the species, subspecies, and varieties of minerals are,

1. *Colour*.—The principal colours in the mineral kingdom are, according to Werner, eight, viz. white, gray, black, blue, green, yellow, red, and brown. Each of these colours, however, shades into a great number of varieties, many of which have been accurately defined in *suites* of coloured patches, to limit the precise tint. Of the use of definite terms relating to colour, the work of Mr P. Syme * is an able illustration.

Many minerals possess the property of changing colours according to the light in which they are viewed. This is termed the *play of the colour*, and is exemplified in the diamond and precious opal. Others possess a *changeability of colour*, as in Labrador felspar and common opal, the last of which when viewed on the surface is milk-white, but when held between the eye and the light is lime yellow. *Iridescence* is another characteristic of some minerals; and a mineral is said to be *tarnished*, when it shows upon its external surface or on that of the distinct concretions, fixed colours, different from those on its interior or fractured surface.

2. *Form*.—*Common external forms* are those in which there are neither a determinate number of planes meeting under determinate angles, nor any resemblance to known natural or artificial

* Werner's Nomenclature of Colours, adapted to Zoology, Botany, Chemistry, Mineralogy, Anatomy, and the Arts. 8vo.

bodies. Six different kinds are enumerated by Werner, distinguished according to their relative length, breadth, and thickness, their relative magnitude, and their connections with other minerals. These are, massive—disseminated—in angular pieces—in grains—in plates—and in flakes or thin laminæ.

Particular external shapes differ from the others in bearing a resemblance to natural or artificial bodies. These are elongated—rounded—flattened—and cavernous.

Distinct concretions are those parts into which minerals are naturally divided, and which can be separated from one another without breaking through the solid or fresh part of the mineral.

The *external surface* of minerals is uneven, granulated, rough, smooth, streaked, or drusy. The *lustre* is splendid, shining, glistening, glimmering, or dull. And the *fracture*, or surfaces produced on breaking mineral substances, is characterized as splintery, even, conchoidal, uneven, earthy, hackly, or slaty.

The *transparency* of minerals affords an obvious mark of distinction; and where it occurs in the highest degree, it is said to be transparent,—next semitransparent—translucent—translucent on the edges,—or opaque. The *streak* is the appearance which minerals exhibit when scratched or rubbed with a hard body, as a knife. In some instances the colour of the mineral is changed; in others the lustre. The term *soiling* is used when a mineral leaves part of its substance on the fingers; and *tenacity* expresses the relative cohesion of the different particles. Besides these obvious characters used in the distinction of species, are frangibility—flexibility—adhesion to the tongue—unctuosity—taste—and smell.

By means of these characters alone the different species of minerals may be discovered and arranged.

Simple minerals are arranged by Professor Jameson into three classes, viz.

CLASS I.

Specific gravity under 3.8. If solid, is sapid. No bituminous smell.

ORDER I.—GAS.

Sp. gr. = 0.0001,—0.00014. Elastic. Not acid.

Gen. 1. Hydrogen gas. 2. Atmospheric air.

MINERALOGY.

ORDER II.—WATER.

Liquid ; tasteless, or with sensible taste and smell. Sp. gr. = 1.1—1.0269.

Gen. 1. Atmospheric water. 2. Sea water.

ORDER III.—ACID.

Sp. gr. = 0.0045,—3.7. Acid.

Gen. 1. Carbonic acid. 2. Muriatic acid. 3. Sulphuric acid. 4. Boracic acid. 5. Arsenic acid.

ORDER IV.—SALT.

Sp. gr. = 1.2,—2.9. Solid. Not acid.

Gen. 1. Natron. 2. Glauber Salt. 3. Nitre. 4. Rock Salt. 5. Sal Ammoniac. 6. Vitriol. 7. Epsom Salt. 8. Alum. 9. Borax. 10. Glauberite.

CLASS II.

Specific gravity above 1.8. Insipid.

ORDER I.—HALOIDE.

No metallic lustre ; streak white or gray. Hardness = 1.5,—5.0.
Sp. gr. = 2.2,—3.3.

Gen. 1. Gypsum. 2. Cryolite. 3. Alumstone. 4. Fluor. 5. Apatite. 6. Limestone.

ORDER II.—BARYTE.

No true metallic lustre ; streak white and gray, or orange-yellow. Hardness = 2.5,—5.0. Sp. gr. = 3.3,—7.3. If adamantine, or imperfect metallic lustre, the sp. gr. = 6.0, and more. If the streak is orange-yellow, the sp. gr. = 6, and more, and the hardness = 3.0 and less. If the sp. gr. is under 4.0, and the hardness = 5.0, the cleavage is diprismatic.

Gen. 1. Sparry Iron. 2. Red Manganese. 3. Calamine. 4. Tungsten or Scheelium. 5. Baryte. 6. Lead Spar.

ORDER III.—KERATE.

No metallic lustre ; streak white or gray ; no single distinct cleavage. Hardness = 1.0,—2.0. Sp. gr. = 5.5.

Gen. 1. Corneous Silver. 2. Corneous Mercury.

ORDER IV.—MALACHITE.

No metallic lustre. Colour blue, green, brown. No single distinct faces of cleavage. Hardness = 2.0,—5.0. Sp. gr. = 2.0,—4.6. If brown in colour or in streak, the hardness = 3.0 and less, and the sp. gr. above 2.5. If white in the streak, the sp. gr. = 2.2 and less, and the hardness under 3.0.

Gen. 1. Copper green. 2. Liriconite. 3. Olivenite. 4. Blue Malachite, or blue Copper. 5. Emerald Malachite. 6. Green Malachite. 7. Atacamite.

ORDER V.—MICA.

Cleavage monotomous and very distinct. Hardness = 1.0,—4.5. Sp. gr. = 1.8,—5.6. If metallic lustre, the sp. gr. is under 2.2. If no metallic lustre, the sp. gr. is above 2.2. If the streak is yellow, the sp. gr. is under 3.2. If the hardness is above 2.5, it is rhomboidal; if the sp. gr. is under 2.5, it is metallic; if above 4.4, the streak is white or gray.

Gen. 1. Copper Mica. 2. Uran-Mica, or Uranite. 3. Cobalt Mica, or red Cobalt. 4. Antimony Mica, or White Antimony. 5. Blue Iron, or Iron Mica. 6. Graphite. 7. Talc-Mica. 8. Pearl-Mica.

ORDER VI.—SPAR.

No metallic lustre. Streak white or gray, and brown. Hardness = 3.5,—7.0. Sp. gr. = 2.0,—3.7. If rhomboidal, the sp. gr. = 2.2, and less, or the hardness = 6.0. If hardness = 4.0, the cleavage is monotomous. If hardness above 6.0, the sp. gr. is under 2.5, or above 2.8, and the lustre is pearly. If sp. gr. above 3.3, the combination is hemi or tetarto-prismatic, or the hardness = 6.0, and no adamantine lustre. If sp. gr. = 2.4, and less, there are traces of form and cleavage.

Gen. 1. Schiller-Spar. 2. Kyanite. 3. Spodumene. 4. Prehnite. 5. Datolite. 6. Zeolite. 7. Petalite. 8. Felspar. 9. Augite. 10. Azure spar.

ORDER VII.—GEM.

No metallic lustre. Streak white or gray. Hardness = 5.5,—10.0. Sp. gr. = 1.9,—4.7. If hardness = 6.0, and less, the sp. gr. = 2.4, and less, and no traces of form or cleavage. If sp. gr. is less than 3.8, there is no pearly lustre.

Gen. 1. Andalusite. 2. Corundum. 3. Diamond. 4. Topaz. 5. Emerald. 6. Quartz. 7. Axinite. 8. Chrysolite. 9. Boracite. 10. Tourmaline. 11. Garnet. 12. Zircon. 13. Gadolinite.

ORDER VIII.—ORE.

Hardness = 2.5,—7. Sp. gr. = 3.4,—7.4 If the lustre is metallic, the colour is black; if not metallic, it is adamantine or imperfect, or semi-metallic lustre. If the streak is yellow or red, the hardness = 3.5, and more, and the sp. gr. = 4.8, and more. If the streak is brown or black, the hardness = 5.0, and more, or the cleavage monotomous. If the hardness = 4.5, and less, the streak is yellow, red, or black. If the hardness = 6.5, and more, the streak is white or gray, and the sp. gr. = 6.5, and more.

Gen. 1. Titanium Ore. 2. Zinc Ore. 3. Red Copper Ore. 4. Tin Ore. 5. Wolfram Ore. 6. Tantalum Ore. 7. Uranium Ore. 8. Cerium Ore. 9. Chrome Ore. 10. Iron Ore. 11. Manganese Ore.

ORDER IX.—NATIVE METAL.

Lustre metallic; not black. Hardness = 0.5. Sp. gr. = 5.7,—2.0. If gray, it is malleable, and the sp. gr. = 7.4, and more. If the hardness equal 4.0, it is malleable.

Gen. 1. Arsenic. 2. Tellurium. 3. Antimony. 4. Bismuth. 5. Mercury. 6. Silver. 7. Gold. 8. Platina. 9. Iron. 10. Copper.

ORDER X.—PYRITES.

Lustre metallic. Hardness = 3.5,—6.5. Sp. gr. = 4.1,—7.7. If hardness = 4.5, and less, the sp. gr. is less than 5.0. If sp. gr. = 5.3, and less, the colour is yellow or red.

Gen. 1. Nickel Pyrites, or Copper Nickel. 2. Arsenic Pyrites. 3. Cobalt Pyrites. 4. Iron Pyrites. 5. Copper Pyrites. 6. Undetermined Pyrites.

ORDER XI.—GLANCE.

Lustre metallic. Gray black. Hardness = 1.0,—4.0. Sp. gr. = 4.0,—7.6. If sp. gr. under 5.0, and cleavage monotomous, the colour is lead gray. If sp. gr. above 7.4, the colour is lead gray.

Gen. 1. Copper Glance. 2. Silver Glance, or Vitreous Silver. 3. Galena, or Lead Glance. 4. Tellurium Glance, or Black Tellurium. 5. Molybdena, or Molybdena Glance. 6. Bismuth Glance. 7. Antimony Glance. 8. Melane Glance.

ORDER XII.—BLENDE.

Hardness = 1.0,—4.0. Sp. gr. = 3.9,—8.2. If the lustre is metallic, the colour is black; if not metallic, it is adamantine. If the streak is brown, white, or gray, the sp. gr. is between 4.0 and 4.2, and the form tessular. If the streak is red, the sp. gr. = 4.5, and more, and the hardness = 2.5, and less. If the sp. gr. = 4.3, and more, the streak is red.

Gen. 1. Manganese Blende. 2. Zinc Blende, or Garnet Blende.
3. Antimony Blende, or Red Antimony. 4. Ruby Blende.

ORDER XIII.—SULPHUR.

No metallic lustre. Colour yellow, red, or brown. Prismatic. Hardness = 1.0,—2.5. Sp. gr. = 1.9,—3.6. If sp. gr. above 2.1, the streak is yellow or red.

Gen. 1. Sulphur.

CLASS III.

Specific gravity under 1.8. If liquid, the smell is bituminous; if solid, is tasteless.

ORDER I.—RESIN.

Hardness = 0,—2.5. Sp. gr. = 0.7,—1.6. If sp. gr. = 1.2, and more, the streak is white or gray.

Gen. 1. Mellite, or Honey-stone. 2. Mineral Resin.

ORDER II.—COAL.

Streak brown and black. Hardness = 1.0,—2.5. Sp. gr. = 1.2,—1.5.

Gen. 1. Mineral Coal.

APPENDIX. NEW MINERALS.

Professor Jameson concludes his system by giving a list of newly described or imperfectly known minerals, such as Allophane, Bismuthic Silver, Blædite, Brewsterite, &c.

GEOLOGY.

GEOLOGY or *Geognosy*, for the terms are nearly synonymous, is that branch of science which treats of the terrestrial globe, considered principally with regard to the nature and disposition of the mineral masses of which the crust of the earth is composed. This branch of science had scarcely an existence, till Saussure and Werner pointed out the bases upon which it was founded. The first of these philosophers, by a laborious investigation of the most inaccessible mountain districts, during twenty years of continual research, demonstrated the order of the primitive formations, and traced the boundaries which distinguish them from such as are later in point of time; and Werner, taking advantage of the numerous excavations in some of the oldest mining districts, first classified the rocks of which the crust of the earth is composed, attempted to fix the laws which appear to regulate the succession of strata, pointed out their relative antiquity, and traced their various changes. To these names may be added that of Baron Cuvier, whose discoveries in the natural history of fossil organic remains and their distribution, have given new interest to geological investigations. Numerous other writers have at various periods contributed to extend the science of geology, either by the communication of facts or the proposal of theories to explain existing appearances. Among these it is only necessary to mention Whitehurst, Hutton and Playfair, Greenough, Buckland, and Jameson. And societies for the special purpose of geological investigation have been formed in various parts of the world.

In a general view, the surface of the globe is composed of land and water. The water occupies nearly three-fourths of the surface, and the land above its level is arranged into masses varying in magnitude and form. This land, however, is not equally distributed; for a much larger portion occurs to the north than to the south of the equator; and while the southern half is occupied chiefly by water, the northern division is principally land.

The land surface of the globe has been, for convenience of description, formed into two divisions, termed the *old* and *new* world, in relation to their priority of habitation. Europe, Africa, and Asia form the first; and the great continent of America the second. All the great peninsulas in both, it has been remarked, point towards the south; and there are many minor points of agreement in the disposition of the continents which have been observed as common to both. All are variegated by inequalities of the surface more or less conspicuous, as ranges of lofty mountains, single isolated mountains or mountain groups, hills, plains, and valleys. The direction of mountain groups is generally according to the longitudinal dimension of the continents or islands in which they occur; and the principal valleys are at right angles on each side of this longitudinal line.

Of the agents in nature which have produced these inequalities, the atmosphere and water, both by their mechanical and chemical action, seem to be the most efficient. Water falling on the surface of mineral bodies of various composition, aided by the action of the atmosphere, soon forms hollows in the more easily decomposed parts; these hollows form lakes; lakes surcharged with water burst the barriers which confine them and produce rivers; these deepening their channels, form shelving banks, which give an additional power to the waters which fall from the atmosphere, and valleys are formed. According to the nature of the mountain masses, the softer parts are washed or crumble away, and thus are produced in the more untractable, pointed pyramidal peaks, or in those more subject to the wasting power, rounded eminences, or undulating surfaces. Thus the present variegated surface of the earth is supposed, in the course of ages, to have been produced by the mechanical and chemical effects of air and water; and, however gradual the operation, in every successive season, according to Professor Playfair, some change is produced for which no compensation is made, and something removed which is never to be replaced. Measurement has ascertained that the present surface of the land, as compared to the level of the sea, is gradually lowered; and the soil carried down to the sea by rivers, and which mingles with their waters, affords palpable evidence of this waste and disintegration. The vast quantity of earthy matters thus transported to the basin of the ocean by the different rivers, carried

by currents and deposited in its bottom or along its shores, may eventually raise the level of the present ocean, and change the whole surface of the globe.

But independent of the gradual changes effected and effecting on the earth's surface by the agency of the atmosphere and water, evidences of changes more abrupt, and revolutions in the materials of which it is composed not to be accounted for by this agency, are evident in most of the strata. Rocks high above the present level of the sea, but filled with fossil fragments of the former inhabitants of the ocean, attest a great change at some former period, and beyond the reach of human records; and remains of animals of gigantic size, and unlike any of the present races of living beings, lead back to a period of the world's history equally remote. Besides, the stratified rocks, raised in various degrees from the horizontal plane, dislocated and bent in various forms, are adverse to the theory of aqueous solution, as accounting for their present appearance; and thus earthquakes and volcanoes, a central fire, and other agents, have been brought in to account for the position of the mineral masses which compose the surface of the earth.

It would be out of place here to detail the various theories which have been hazarded to account for the present appearances of the land surface of our globe. It is only necessary to mention that two great theories have been proposed, the one assuming that water was the principal agent, and the other attributing the present appearances to the agency of heat or fire. That neither of these taken singly is sufficient to account for the present distribution and arrangement of rocks, is demonstrated by numerous facts. A third theory has been proposed, a kind of amalgamation of the two former, by which both fire and water are conceived to have had their part in producing the present appearances—the aqueous solution lodging the materials in horizontal beds or strata, and the dislocation and inclination, as well as other appearances, being produced by a central force moving upwards. A greater accumulation of facts and observations is perhaps necessary to determine this matter; but it is satisfactory in the meantime to be aware that the discoveries of philosophy are in consonance with the details of the early ages of the world given in the Sacred Writings.

Lehman was the first writer who arranged the stony masses

of which the crust of the earth is composed into *Primitive* and *Secondary*; the first including rocks destitute of fossil organic remains, and which he considered as disposed in highly inclined strata, and forming the most lofty points on the earth's surface; the second comprehending rocks containing petrifications, or associated with others including such remains, disposed in a form more horizontal, and forming the lower and softer portions of the land surface. Werner pointed out another class of rocks which he named *Transition*, from exhibiting the blended characters which show the transition of the primitive to those of a secondary description. The same naturalist formed a fourth class of rocks under the term *Alluvial*, as designating these more loosely compacted masses of clay, marl, loam, &c. which rest on the more solid and older rocks; and he termed a fifth class of mineral masses, formed by the agency of subterraneous fire, *Volcanic* rocks.

I. PRIMITIVE ROCKS.—Primitive Rocks are distinguished by the absence of all fossil organic remains; and it has hence been inferred, that there was a period in the history of our planet when plants and animals did not exist. The rocks of this class lie under those of the succeeding classes, and frequently also rise through them to a great height, in the form of mountains and mountain chains. Countries composed of primitive rocks are generally more rugged and lofty, their inequalities more conspicuous, and their vallies deeper, narrower, and more uneven than in districts composed of secondary rocks. The strata of primitive mountains are also remarked as being also higher inclined than the secondary class; and in many countries preserve a uniformity of direction. In Scotland their general direction is from N. E. to S. W. and the same is nearly the case in the alpine regions of Norway, and other mountain chains in Europe. They abound in metalliferous minerals, as tin, wolfram, and molybdena. Gold, silver, lead, copper, iron, cobalt, zinc, manganese, arsenic, and mercury occur either disseminated in beds, or veins, in various rocks of this class; and the most beautiful of all the gems occur in great variety in the primitive rocks.

The rocks of the primitive series are granite, porphyry, trap, serpentine, limestone, gneiss, mica-slate, clay-slate, and quartz

rock. These rocks are very simple in their nature, being generally composed of not more than five minerals, viz. quartz, felspar, mica, hornblende, and limestone. Some rocks are composed of but one of these simple minerals, as quartz rock ; others of two, such as mica-slate, which is a compound of mica and quartz ; and others, as granite, consist of three, quartz, felspar, and mica. An intimate acquaintance with these five simple minerals, and with the appearances they assume in aggregated mountain rocks, will enable the student to determine their species. The primitive rocks are thus characterized by Professor Jameson :

“ 1. *Granite* is a granular compound of felspar, quartz, and mica ; *syenite* is a variety of granite, containing, besides the ingredients already enumerated, also hornblende.

“ 2. *Porphyry* is an aggregate rock, having a basis or ground containing imbedded grains and crystals of felspar, and sometimes of quartz and hornblende.

“ 3. *Trap*.—All the rocks of the primitive class in which hornblende is the predominating ingredient are named trap. On exposure to the air they assume the form of steps of a stair, hence the name *trap*. When the hornblende is associated with felspar, it forms *greenstone* ; if unmixed, *hornblende rock* ; and if slaty, *hornblende slate*.

“ 4. *Serpentine* is a dark green rock, with a splintery fracture, and glimmering or dull lustre, translucent on the edges, and so soft as to yield readily to the knife. It is conjectured to be a compound of felspar, and of a mineral of the nature of hornblende, named diallage.

“ 5. *Limestone*.—This rock has generally a white or gray colour, is composed of shining granular concretions, and is more or less translucent. It frequently contains scales of mica and grains of quartz.

“ 6. *Gneiss* is a granular slaty compound of felspar, quartz, and mica.

“ 7. *Mica-slate* is a slaty compound of mica and quartz.

“ 8. *Clay-slate* is a slaty rock, generally composed of extremely minute scales of mica. It is the roof slate so well known in the arts.

“ 9. *Quartz rock*.—This rock is almost entirely composed of quartz, either in granular concretions, or in the compact state ; and grains of felspar and scales of mica are frequently contained in it.”

II. TRANSITION ROCKS.—Transition rocks succeed to the

primitive. The mountain ranges and cliffs in this series, less rugged and softer in their outline than the primitive rocks, and with wider valleys and sides less abrupt, present, however, a bolder outline than those of what are termed the secondary formation. Most of the Transition rocks are distinctly stratified; the strata are frequently vertical, and, like those of the primitive class, exhibit the same general direction through large tracts of country. Thus the strata in the great high land which ranges from St Abb's Head to the Irish sea, and which is almost composed of transition rocks, range everywhere nearly from N. E. to S. W.

The crystallization of the transition rocks appears to be less perfect than that of the primitive rocks, because the parts of which they are composed have a lower degree of lustre, inferior hardness, less translucency, and colours of less purity. They are, besides, distinguished by the important circumstance of containing fossil organic remains. These remains are of animals low in the zoological scale, as corals, shells; and of vegetables belonging to the class *Cryptogamia*. Hence it has been concluded that the primitive class of rocks existed prior to the creation of animals; and that those classes of living beings whose remains are found in the transition series had existed previously or contemporaneously with them. Transition rocks frequently abound in ores of various descriptions. The mining districts of Leadhills and Wanlockhead in Scotland are in transition rocks; the lead and silver mines in the Hartz, and many of those in Mexico, are in rocks of the same description. Gems are comparatively rare in this class of rocks. The rocks comprehended in this division are greywacke, clay-slate, limestone, trap, granite, syenite, porphyry, serpentine, gneiss, mica-slate, and quartz-rock, thus characterized by Professor Jameson.

“ 1. *Greywacke* is a conglomerated looking rock, with a basis of clay-slate, including angular and various shaped portions (by many considered as fragments) of clay-slate, flinty-slate, quartz, felspar, &c. and occasionally scales of mica. When the imbedded masses become small, and the mass slaty, it is named *greywacke-slate*.

“ 2. *Clay-slate*.—This rock is of the same general nature with primitive clay-slate, but differs from it in having less lustre, and in sometimes containing fossil plants and fossil shells.

“ 3. *Limestone*.—It is more compact, and much smaller granular,

and therefore has less lustre and lower translucency than the primitive limestone. It is frequently traversed by veins of calcareous spar, and often exhibits in the same bed various tints and shades of beautiful colours. Some varieties are conglomerated, forming the *brecciated marble* of artists, and others contain fossil shells and corals.

“ 4. *Trap*.—This rock, like that of the primitive class, is principally composed of hornblende, and is sometimes associated with felspar, forming *transition greenstone*.

“ 5. *Granite, Syenite, and Porphyry*.—These have the same composition as in the primitive class ; and, independent of the characters derived from their mass, and their particular imbedded minerals and veins, are distinguished by the greywacke, with which they are associated.

“ 6. *Gneiss and Mica-Slate*.—These rocks occasionally occur associated with the greywacke and other members of this class.

“ 7. *Serpentine and Quartz Rock*.—These very nearly resemble those of the primitive class, but are distinguished from them by their connection with greywacke,” &c.

III. SECONDARY ROCKS.—This extensive class of rocks in their geological position rest immediately on those of the transition class ; but when these are wanting succeed the primitive series. The hills of secondary districts are lower, rounder, with acclivities more gentle, and fewer abrupt cliffs, than in the preceding series. The valleys which occur are also less deep. Nearly all the secondary formations are more or less distinctly stratified, and the strata are more frequently horizontal than in the older rocks. The regularity of direction of the strata, so remarkable in the two preceding classes, has not been observed in the present. Secondary rocks are particularly distinguished by the variety and abundance of fossil organic remains contained in them. In the older formations of the series, remains of oviparous quadrupeds or lizards are met with, while in the newer members a gradual approximation is found in the animal remains to the more perfect classes. Coal, of which one species occurs in the primitive and secondary rocks, is found in the secondary class in great abundance. The most abundant metals in this series are iron, lead, and copper ; zinc in the form of calamine ; mercury in the form of cinnabar, and cobalt. Rock salt first makes its appearance in this series of

rocks. The principal secondary rocks are sandstone, limestone, and trap, arranged in various positions, and associated with other rocks. Professor Jameson thus enumerates them in the order of their relative position :—

“ 1. *First Sandstone, or Old Red Sandstone Formation.*—This is a reddish-brown sandstone, principally composed of particles of quartz, either without the ground, or connected together by a basis or ground of iron-shot clay. It passes into greywacke, as on the coast of Galloway. It rests upon the rocks of the transition class.

“ 2. *First Secondary Limestone, or Mountain Limestone.*—is a compact bluish-gray limestone, full of encrinites, corals, and shells. Often contains caverns, and sometimes alternates with the sandstone, slate-clay, and other rocks of the coal formation. It lies immediately on the old red sandstone.

“ 3. *Coal Formation.*—This is an alternation of gray and white sandstone, bituminous shale and slate clay, clay ironstone, limestone, and coal. The whole together form a group or set of rocks, termed the coal formation. It rests on the mountain limestone.

“ 4. *Second Secondary Limestone, or Magnesian Limestone of Geologists.*—This formation, as it appears in England, is generally a granular, sandy, and glimmering limestone, which contains a considerable portion of carbonate of magnesia. It occasionally contains gypsum and rock salt. It lies immediately over or above the coal formation.

“ 4. *Second Sandstone, or New Red Sandstone Formation.*—This sandstone is principally composed of particles of quartz, set in a reddish-brown clayey basis or ground. It is looser in its nature than the old red sandstone, and its colour wants the bluish tint which occurs in the old red sandstone. It is sometimes conglomerated, particularly where near the magnesian limestone, when it contains fragments of the subjacent strata. It abounds in beds of red and blue marl and clay, and in these there are occasionally imbedded masses and beds of gypsum, and rock salt. It is here, and in the magnesian limestone formation, that the greatest masses of rock salt are met with, and it is in these formations of the secondary series that the principal salt mines are situated. It rests immediately on the second secondary or magnesian limestone.

“ 5. *Third Secondary Limestone, or the Oolite or Shell Limestone Formation, or Jura Formation.*—The lower members of this formation are blue, gray, and white slaty limestone, with blue slaty marl, and clay, in which are variously shaped masses of chert. These are known under the name *Lias*. Above these, still in this forma-

tion, there are alternations of beds of oolite limestone, shelly limestone, calcareous sandstone, various marls, clays, and fuller's earth. It rests upon the second or new red sandstone.

“ 6. *Third Sandstone Formation, or the Green Sand Formation.*—This formation extends through a large portion of the south-eastern parts of England. Its characteristic member is a siliceous sandstone, abounding in grains of a substance resembling green earth or augite. Besides this sandstone, the formation contains beds of a coarse shelly limestone, of various clays, fuller's earth, and of iron sand. It rests upon the third limestone or oolite formation.

“ 7. *Fourth Limestone Formation, or Chalk Formation.*—The lower part of this formation is composed of a gray clayey chalk, without flints, and of gray-coloured clays and marls. Immediately above is a hard chalk, with few flints, and above is the softer chalk in which flints and organic remains abound.

“ 8. *Brown Coal Formation.*—In this formation, which appears to rest upon chalk, brown coal occurs in great masses, associated with clays and marls, and occasionally with glance coal. The English *pudding-stone* appears to rest immediately, either on the brown coal or the chalk formations.

9. *Paris Formation.*—Under this head we include the series of beds of clay, marl, limestone, gypsum, sand, and sandstone, that occur in the basin of Paris, and also in that of the Isle of Wight and other quarters. They lie above chalk, and higher than the brown coal, and are divided into sets; two characterized by the presence of fresh water shells, and remains of quadrupeds, are named *fresh water formations*; and other two, containing principally salt water shells, are named *marine formations*.

“ 10. *Secondary Trap Rocks.*—The rocks of this division have been described by many geologists as lavas. They occur in imbedded masses, beds and veins, in many of the formations already described, and hence, in order to prevent repetition, we have brought them together under one division. They are principally composed of augite, with occasional hornblende and felspar; the augite occurs in all its states from the crystalline to the earthy or powdery condition, and the felspar appears in all the different states from claystone and clay to the crystalline state. The following are the secondary trap rocks: *Basalt, greenstone, syenite, amygdaloid, porphyry, and tuffa.*”

IV. *ALLUVIAL STRATA.*—The various clays, loams, marls, sands, gravels, rolled masses, &c. which lie over the more solid rocks, are included in this division. They are divided into two

groups; the first termed *Diluvian*, because conjectured to have been formed at the period of the general deluge. In the strata of this description are found remains of the elephant, rhinoceros, and other large animals. Many of the boulders, or rolled masses, belong to this formation. 2. *Postdiluvian*, or those formed since the deluge by the decomposing effects of water and the atmosphere.

V. VOLCANIC ROCKS.—All those rocks which seem to owe their present characters to the action of subterranean heat are termed volcanic. They are divided into *true volcanic* and *pseudo-volcanic*; the first consisting of masses which have run in streams, or have been projected in the form of dust or small masses from the craters of volcanos in a state of activity, such as lava, tuffa, and volcanic dust; the second comprehending clays and ironstones, indurated and partially melted by the heat from beds of burning coal.

Such are the arrangements of the mineral masses which form the surface of the globe, detailed more with the view of classification and nomenclature than as suggesting any theory of their formation. A much greater number of recorded facts is probably necessary to warrant the assumption of general principles applicable to the formation of any class. What is already known leads the mind by steps back to the world's early history, and presents to contemplation a period when no plants or animals were in being, and ages perhaps before man was called into existence, to observe and record. It is satisfactory, however, to find, that the facts observed may all be explained in accordance with the earliest history of the world as preserved in the Sacred Writings; and though it would not invalidate the authority of that most venerable volume, should an apparent incongruity exist between modern physical observation and a narrative dedicated chiefly to man and his moral history, yet the coincidence in most minds will not be without its value in the estimation of rival theories.

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DESCRIPTION OF PLATES.

PLATE V.—MOLLUSCA AND CONCHIFERA.

- Fig. 1. *Loligo vulgaris*. The Cuttle-fish.
2. *Nautilus Pompilius*.
3. The same shell cut to show the divisions.
4. *Conus generalis*.
5. *Voluta musica*, cut to show the whorls of the pillar.—*a*, the plaits of the pillars or columella.
6. *Cypræa exanthema*.
7. *Buccinum undatum*.—*a*, the whorl of the spire.
8. *Dolium galea*.
9. *Rostellaria pes-pelecani*.
10. *Murex erinaceus*.
11. *Trochus zizyphinus*.
12. *Scalaria pretiosa*. The Wentletrap.
13. *Nerita peloronta*.—*a*, outer lip.—*b*, inner lip.
14. *Lymnea stagnalis*.
15. *Planorbis corneus*.
16. *Chiton marginatus*.
17. *Helix arbustorum*.
18. *Arca Noë*.—*a*, the umbo, or swelling of the beak.—*b*, the hinge, with its numerous teeth.
19. *Pecten Jacobæus*.
20. *Cytherea exoleta*.—*a*, the breadth, or transverse diameter.—*b*, the longitudinal diameter.—*c*, the posterior depression. *
21. *Tellina radiata*.—*a*, *a*, muscular impressions.
22. *Mactra subtruncata*.

* The right and left sides of a Univalve shell are ascertained, according to Linnæus, Lamarck, and others, by placing the shell erect with its opening to the observer; while Draparnaud and Blainville place the shell obliquely on its mouth, with the summit behind and upwards. In both cases the terms *right* and *left* side are applicable to the same portion of the shell. In Bivalve shells, Linnæus, Lamarck, and others, place the shell on the beak or summit with the opening above and the ligament before; while Blainville and others suppose it placed on its edges, and the ligament between the summits and the observer. The vertical diameter in this case, or from the ligament, is the length of the shell according to Linnæus and Lamarck, and the breadth according to Muller; and a line at right angles to the perpendicular indicates the transverse diameter. That part of the shell in which the ligament is placed is generally termed the *anterior slope*; and the *posterior slope* is the direction of the shell on the opposite side.

PLATE VI.—CRUSTACEA, ARACHNIDES, &c.

- Fig. 1. *Lepas anatifera*.
 2. *Serpula vermicularis*.
 3, 4. *Balanus communis*.
 5. *Dentalium dentalis*.
 6. *Dentalium entalis*.
 7. *Hali thea aculeata*.
 8. *Pontobdella spinulosa*.
 9. *Gecarcinus ruricola*. The Land Crab.
 10. *Pinnotheres pisum*.
 11. *Pagurus Bernhardus*, in the shell of *Buccinum undatum*.
 12. *Crangon vulgaris*. The Shrimp.
 13. *Orchestia littorea*.
 14. *Ligia oceanica*.
 15. *Scorpio Europæus*. The Scorpion.
 16. *Atypus Sulzeri*.
 17. *Nymphon gracile*.
 18. *Chelifer fasciatus*.
 19. *Siro rubens*.
 20. *Glomeris marginata*.
 21. *Craspedosoma Raulinsii*.
 22. *Cryptops hortensis*.

PLATE VII.—INSECTS.

- Fig. 1. *Machilis polypoda*. An insect of the order *Thysanoura*.
 2. *Cicindela sylvatica*. An insect of the order *Coleoptera*.
 3. *Dytiscus marginalis*. An aquatic insect of the order *Coleoptera*.—*a*, larva of ditto.—*b*, pupa.
 4. *Gyrinus natator*.
 5. *Staphylinus major*.
 6. *Lampyris noctiluca*—male.
 7. The female of ditto.
 8. *Hister unicolor*.
 9. *Byrrhus pilula*.
 10. *Necrophorus vespillo*.
 11. *Melolontha vulgaris*.
 12. *Cantharis vesicatoria*.
 13. *Cassida viridis*.
 14. *Coccinella septempunctata*.—*c*, larva of ditto.—*d*, pupa.
 15. *Acridium migratorium*. An insect of the order *Orthoptera*.

16. *Notonecta glauca*. An insect of the order *Hemiptera*.
17. *Myrmeleon formicarius*. An insect of the order *Neuroptera*.
18. *Mutilla Europæa*. An insect of the order *Hymenoptera*.
19. *Vespa vulgaris*. The Wasp.
20. *Apis mellifica*. The Honey-Bee.
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23. *Bombylius medius*. An insect of the order *Diptera*.
24. *Æstrus equi*, male and female.
25. *Musca carnaria*.

PLATE VIII.—ECHINODERMATA, POLYPI, &c.

- Fig. 1. *Echinus esculentus*, an exemplification with the following figure of the *Echinodermata*.
2. *Ophiura lacertosa*.
 3. *Zoanthus Ellisii*.
 4. *Corallina officinalis*.—*a*, a portion magnified to show the form of the cells.
 5. *Corallina squamata*.—*b*, a portion magnified.
 6. *Corallina rubens*.—*c*, a portion magnified.
 7. *Isis hippuris*, without the soft crust.
 8. Ditto, with the soft covering.
 9. *Corallium rubrum*.—*d*, a portion magnified to show the radiated tentacula of the polypus.
 10. *Meandrina labyrinthica*.
 11. *Tubipora musica*.
 12. *Sertularia cupressina*.—*e*, a magnified portion.
 13. *Flustra carbacea*.—*f*, a magnified portion, displaying the form of the cells.
 14. *Sertularia pumila*.—*g*, a portion magnified.
 15. *Tubularia ramosa*.—*h*, a small portion magnified.

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THE END.

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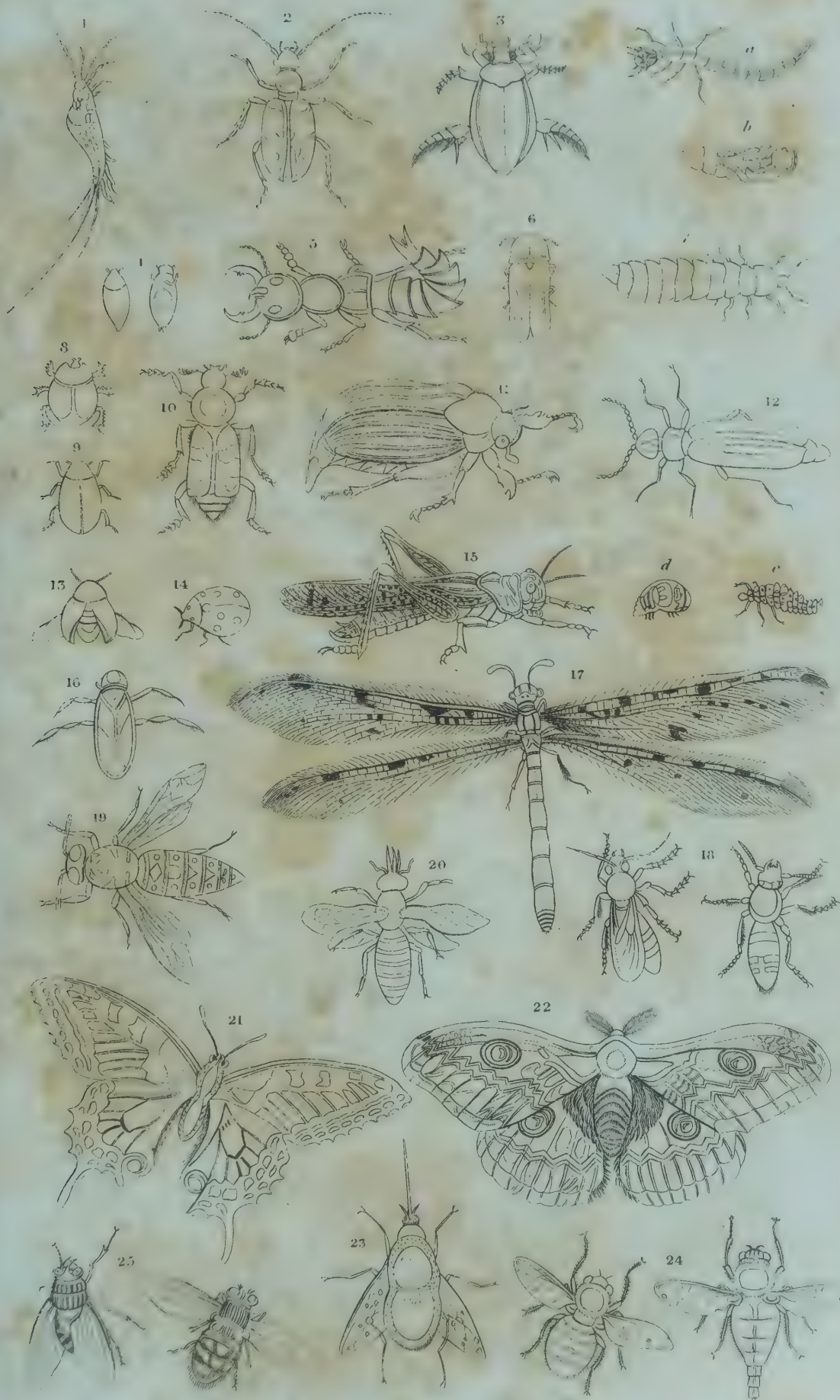


Lewis Sculp

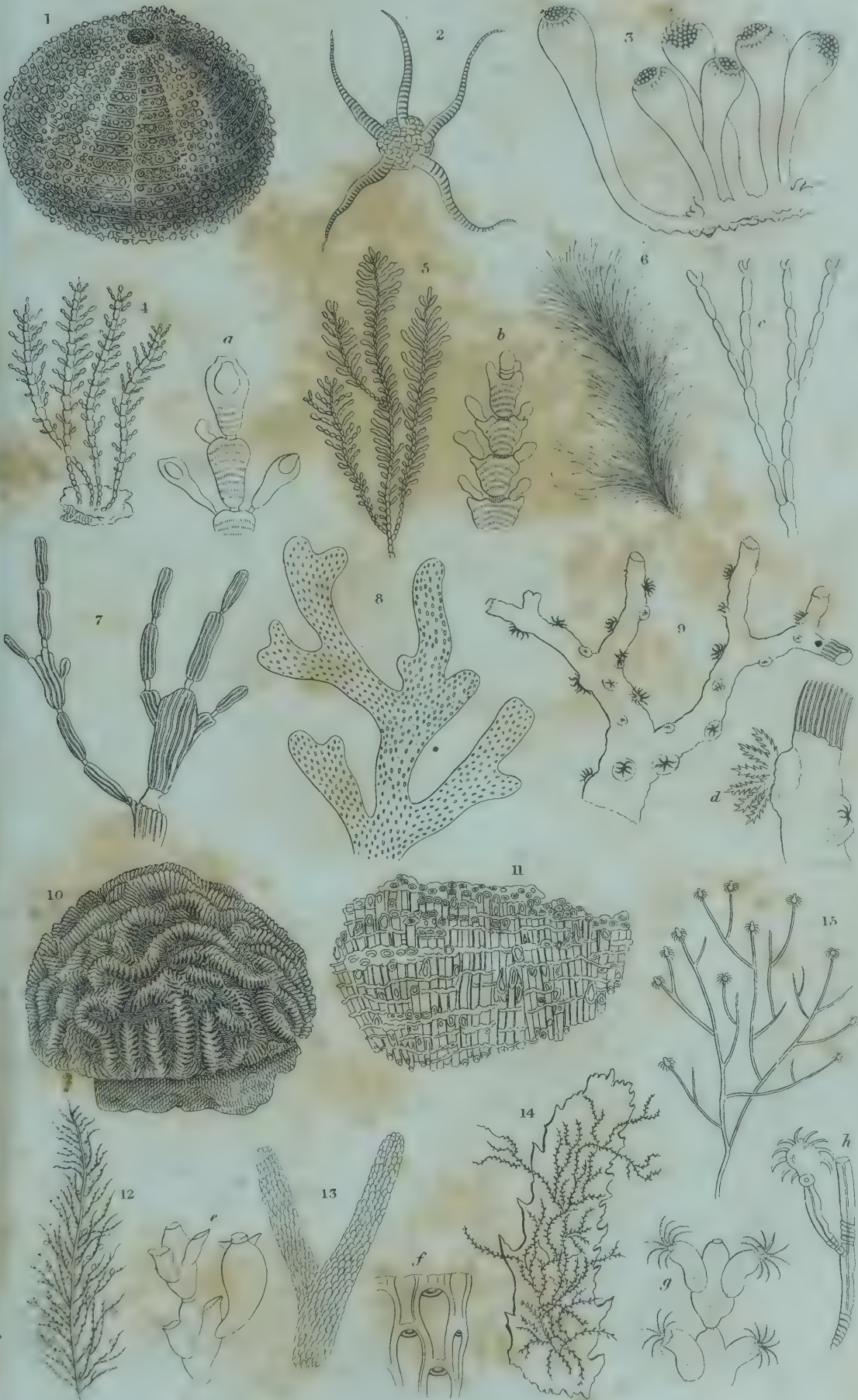




Léars. Sculp.



Lixars Sculp!



Lizars Sculp!



